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ACCOUNT OF
CHOLERA EPIDEMIC
OF 1861
AT
THE
PRINCIPAL STATIONS
OF
NORTHERN INDIA

BY

JOHN STRACHEY

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MINISTRY OF CULTURE • GOVERNMENT OF INDIA
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ACCOUNT OF CHOLERA EPIDEMIC
OF 1861 AT THE PRINCIPAL
STATIONS OF NORTHERN INDIA.

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PREFACE.

JOHN STRACHEY.

The publication of the Report of the Commissioners appointed to inquire into the Cholera Epidemic of 1861 has hitherto been unavoidably delayed.

The first Section of the Report contained an account of the outbreak of Cholera in the principal Military Stations and Districts of Northern India. There were differences of opinion in the Commission regarding some of the statements made in this portion of the Report. These differences related almost entirely to matters affecting individual Officers; the questions at issue had no importance or interest for the public; and their discussion at the present time could throw no light upon the progress or character of the Epidemic, or lead to any useful result. It has therefore been thought undesirable to publish the first Section of the Report in its original form, and, by the desire of the Government, a Narrative, drawn up by myself, has been substituted for it. The greater part of this Narrative has been taken without alteration from the Report of the Commission. Every thing has been retained which appeared to me to possess any historical or scientific interest; and, although animadversions upon individuals have been omitted, there has been no concealment of the causes by which, in some instances, the virulence of the Epidemic was needlessly aggravated.

The second and third Sections of the Report are published without any alterations or omissions. A few modifications of the Rules contained in the last Section have been recommended by the Sanitary Commission for Bengal, and have been approved by the Government of India. These have now been printed as foot notes to the original text.

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The third Section of the Report, with these modifications, will form a Manual for the guidance of all Officers in those parts of India to which it has been declared applicable. Orders have been issued by the Government of India for the strict observance of the Rules which it contains.

JOHN STRACHEY,
President of the Sanitary Commission
for Bengal, and late President of
the Cholera Commission.

CALCUTTA,
April 23rd, 1864.

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THE COMMISSIONERS APPOINTED TO
INQUIRE INTO THE CHOLERA
EPIDEMIC OF 1861,

To

Lieut. Col. H. W. NORMAN, c. b.,
Secretary to the Government of India,
Military Department.

Calcutta, 21*st July* 1862.

Sir,

We have the honor to submit, for the consideration of His Excellency the Governor General in Council, our Report of the investigations which, under the orders of the 31st August last, we were ordered to undertake.

The Members of the Commission first met at Lahore on the 20th September 1861. We then went to Meean Meer, where we remained until the 14th October. We next visited, in succession, Amritsur, Julundhur, Ferozpoor, Umballa, Delhi, Meerut, and Agra, arriving at the last named station on the 28th November. From Agra we went to Morar and Gwalior, and returned to Agra on the 15th December. After visiting Muttra and Futtehgurh, we proceeded to Cawnpoor and Allahabad, where our duties of inspection may be considered to have ended at the close of December. Cholera had ceased at all these stations before we commenced our inquiries.

Major P. Stewart was compelled to leave India on public duty before the completion of our Report. He was present with the Commission during the whole of the inquiry, and we greatly regret that we have lost the advantage of his valuable assistance. That portion of the Report which treats of the special measures to be adopted for the prevention or mitigation of future attacks of Cholera was nearly finished before Major Stewart left the country, and we are authorized to say that he concurs in the recommendations made therein to the Government.

The account of the Cholera at Meean Meer was also completed before his departure, and approved by him.

The inquiry which we were ordered to pursue involved the consideration of many matters connected with the general sanitary condition of the European Troops. Experience, both in this country and in Europe, has proved that wherever the general principles of Sanitary Science are neglected, there can be no security against the ravages of epidemic disease. Thus, in our investigations regarding Cholera, it was necessary that we should inquire into all the more obvious causes which affect the health of the Troops. We have had to examine into the nature of the accommodation provided for the Soldiers in barracks and in hospitals; the character of the climate of the places in which they are stationed; the quality of their food; the habits which affect their health, their duties, their occupations, and their amusements.

Although the history of the late Epidemic cannot be entirely separated from the other questions which we have thus had to investigate, it will nevertheless be convenient to keep it as distinct as may be practicable. We propose, therefore, in our present Report to state the result of our inquiries regarding the late Epidemic of Cholera, reserving, so far as possible, for separate discussion, the subjects of general sanitary importance to which we have referred.

The orders of Government desired us to neglect no point, however minute or apparently trivial, "the investigation of which may tend to show how the attack of the disease may be in any degree warded off, its virulence diminished, or its recurrence prevented." Although we have endeavoured to restrict our present Report to the subject of Cholera alone, the field of our inquiry remains one of great magnitude. The Cholera Epidemic of 1861 was more or less prevalent through a tract of country covering 300,000 square miles, and containing more than sixty millions of inhabitants. A very large portion of our European Force in India was stationed in the Provinces over which these investigations have extended; and in the places actually attacked by the Epidemic, the number of men, women, and children belonging to the European Army exceeded 20,000. Nearly a tenth part of the whole Force was attacked by Cholera. The records of former Epidemics are very imperfect, but so far as we have been able to ascertain, the mortality from Cholera among the European Troops in India was never before so great. This result is, however, mainly due to the excessive virulence of the disease at a few Stations. There is perhaps hardly a case upon record of a mortality so terrible as that which occurred among the Infantry at Meean Meer in August 1861; it would at least be difficult to find its parallel in modern times and among civilized men.

The first Section of our Report contains a description of the special local circumstances which attended the outbreak and progress of Cholera in the Stations and Districts which principally suffered.

The second Section contains an account of the general results of our investigations, with an inquiry into the causes which affected the progress and virulence of the Epidemic.

The third Section contains a statement of the practical measures which we recommend the Government to adopt for the prevention or mitigation of future attacks of the disease.

CALCUTTA, *July* 21*st*, 1862.

We have the honor to be,
SIR,
Your most obedient Servants,

JOHN STRACHEY, *Civil Service*, PRESIDENT.
J. McCLELLAND, *Inspector General of Hospitals*, MEMBER.

NOTE.—Dr. Linton and Lieutenant Colonel Gawler, who are now absent from Calcutta, having objected to some portions of this Report, it has become necessary to submit it without their signatures. Their views will be laid before the Government separately.

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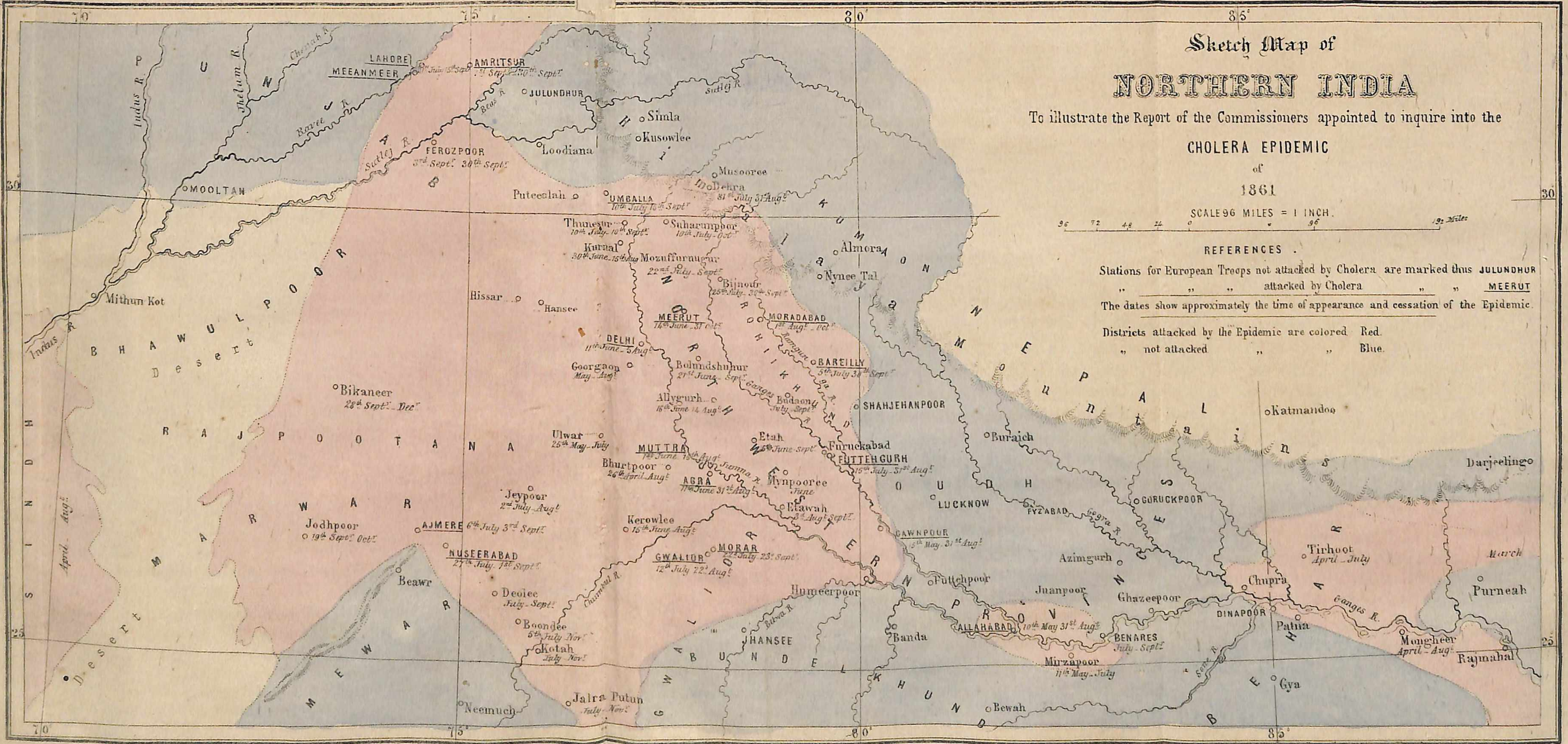

Sketch Map of
NORTHERN INDIA
To illustrate the Report of the Commissioners appointed to inquire into the
CHOLERA EPIDEMIC
of
1861

SCALE 96 MILES = 1 INCH.

REFERENCES.

Stations for European Troops not attacked by Cholera are marked thus JULUNDHUR

" " " attacked by Cholera " " MEERUT

The dates show approximately the time of appearance and cessation of the Epidemic.

Districts attacked by the Epidemic are colored Red.

" not attacked " " Blue.

ACCOUNT

OF THE

CHOLERA EPIDEMIC OF 1861,

AT THE PRINCIPAL STATIONS OF

NORTHERN INDIA.

BY THE PRESIDENT OF THE COMMISSION.

INTRODUCTION.

The object which the Government had in view when the Commission was appointed, was a purely practical one. It was ordered to investigate the circumstances under which Cholera had attacked the European Troops in the North-Western Provinces and in the Punjab during the year 1861; to place upon record all facts of interest that could be discovered; to ascertain, so far as might be practicable, the causes which had aggravated the virulence of the disease; to point out how those causes might have been prevented or avoided; and to endeavour to draw from the history of the past useful lessons for the future. It was no part of the duty of the Commission to investigate the pathology or treatment of the disease. The imperfection of existing knowledge on these difficult branches of the subject need in no way interfere with the adoption of practical measures of precaution. With every increase of knowledge regarding the manner in which Epidemics of Cholera or of other diseases are diffused, it becomes more certain that no Epidemic ordinarily assumes a very destructive character, except under conditions which it is within the power of man to modify or remove. Those conditions are, for the most part, not difficult to discover, even in the existing very imperfect state of our knowledge.

Before proceeding with the detailed description of the circumstances which attended the outbreak and progress of the Epidemic at the various Military Stations of Northern India, it is desirable to give a sketch of its general history. The accompanying map will illustrate this account.

Throughout nearly the whole valley of the Ganges below Allahabad, Cholera has become endemic. There are few years in which it does not appear, and it not unfrequently spreads through the country epidemicall

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with more or less virulence. There seems to have been no unusual prevalence of Cholera in Bengal during the earlier part of 1861. In March and April the disease was, however, common in parts of Northern Bengal and Behar. In March, Dr. McClelland found it in the villages at the foot of the Darjeeling Hills, and in April it was virulent among the coolies employed in carrying stores for the Troops to Darjeeling. It did not spread among the people of the hills. It attacked the districts of Tirhoot and Moteeharee about the same time, the beginning of April, and it appeared in Chupra about the end of the month. Early in June it is said to have ceased in these districts, but to have re-appeared a few weeks later. In July it was very prevalent in Chupra and in Tirhoot, and there was a short outbreak at Patna about the same time. In the Dinapoor Medical Circle, which includes all the districts above named, there were no cases of Cholera among the European or Native Troops during the whole season.

In the next circle to the westward, that of Benares, there was generally little Cholera during 1861. In the districts of Benares, Juanpoor, Ghazeepoor, Azimgurh, and Goruckpoor, the disease does not seem to have prevailed epidemically.

In the city of Mirzapoor, Cholera is said to have appeared on the 11th May, and to have lasted for about a fortnight. There was a second outbreak of the disease early in July, and it continued during the month. But neither of these attacks was at all virulent, and the mortality in the city was small. Between the 2nd and 17th July there were 18 cases of Cholera in the Mirzapoor Jail, of which 7 were fatal.

Among the Native Troops at Benares, there were 6 cases between the 12th and 26th July; and in the months of July, August, and September, at the same station there were 6 cases among the European Soldiers.

Although, in the earlier part of the year, Cholera was thus more or less prevalent in many of the districts lying to the east of Allahabad, it had seldom assumed a decidedly epidemic character. Its progress had attracted little notice, and had created no general alarm. At Allahabad it seemed first to find all the conditions that it required. It broke out virulently among the Natives on the 10th May; on the 19th May it attacked the European Troops; and it did not disappear until nearly the end of August. There were 25 fatal cases among the European Troops.

At Cawnpoor, about 120 miles north-west from Allahabad, Cholera appeared about the same time. Sporadic cases were common in the month of April, and about the middle of May the disease became virulent among the Native population. It continued until the end of August, and there were 36 deaths from Cholera among the European Troops.

In the district of Cawnpoor the disease does not appear to have been at any time very prevalent. In Futtehpoor, the district lying between Allahabad and Cawnpoor, there is said to have been no Cholera at all. In the neighbouring Province of Oudh, on the left bank of the Ganges, and in the districts of Bundelkhund lying to the south of Cawnpoor beyond the Jumna, Cholera seems not to have prevailed epidemically.

In the Doab, or country between the Ganges and the Jumna, Cholera appeared during May or June in almost every district from Cawnpoor to Meerut, and it continued to be more or less prevalent until the close of September. The only stations for European Troops in this part of the country are Futtehgurh and Meerut. At both of these the Soldiers were attacked, and at the latter they suffered severely, losing 107 men, women, and children.

On the right bank of the Jumna, the Epidemic commenced in the Native States of Bhurtpoor and Ulwur at the end of April or beginning of May. It attacked Muttra early in June, and Agra and Delhi a few days later. At Muttra there was very little Cholera among the European Troops, but at Agra there were 73 fatal cases, and at Delhi there were 67.

Cholera was widely spread through the States of Rajpootana in July. It reached Gwalior in the middle of that month. In the Military Cantonment of Morar, near Gwalior, it was extremely virulent, and there were 194 deaths among the European Troops. At Nusseerabad the disease appeared towards the end of July. Here also the European Soldiers were attacked, and 46 deaths occurred among them. Throughout this tract of country, Cholera was more or less common until September.

Still further to the west there was a violent outbreak of Cholera, which extended through nearly the whole Province of Sindh. It commenced in April, and continued until July or August. There were only three fatal cases among the European Troops in Sindh.

On the left bank of the Ganges, in parts of Rohilkhund, the Epidemic prevailed in July, August, and September, but the European Troops suffered very slightly.

During the same months, Cholera spread through the districts of the Cis-Sutlej States, Thanesur, and Umballa. At the Military Station of Umballa there were 63 deaths among the European Troops.

North of the Sutlej in the Punjab there was very little Cholera among the Native population, but at Meean Meer, the Military Cantonment of Lahore, it attacked the European Troops early in August with terrible violence, and it continued until the middle of September. There were 535 deaths from Cholera among the Troops at Meean Meer.

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Early in September the disease appeared among the European Soldiers at Amritsur, and 43 fatal cases occurred. About the same time it attacked the Native Troops stationed at Ferozpoor.

Cholera did not spread epidemically through any of the districts in the Punjab, north of Lahore. It was, however, virulent at Cabul in October.

In the States of Bikaneer and Marwar, in Rajpootana, it appeared in September and October, and it had hardly disappeared at the close of the year.

Altogether, in the North-Western Provinces and in the Punjab, there were 1,929 cases of Cholera, and 1,231 deaths, among the men, women, and children of the European Troops, during the prevalence of the Epidemic from June to September. The accompanying Table shows the manner in which each branch of the service was attacked at each station.

The foregoing sketch will have shown that the disease was spread over a vast tract of country during the hot and rainy seasons of 1861. The Second Section of the Report of the Commission describes the course which the Epidemic appears to have followed; the meteorological conditions by which it was accompanied; and all results of general importance which have been ascertained. The circumstances of local interest under which the disease attacked the stations and districts of Northern India, will now be stated. The Narrative commences with an account of the Epidemic at Meean Meer, where, under the orders of Government, the Commission first assembled.

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MEEAN MEER.

No where did the pestilence fall upon our European Soldiers with such terrible violence as at Meean Meer, the Military Cantonment of Lahore. Out of a force comprising 2,452 men, women, and children, 880 were attacked with Cholera, and 535 died in the space of little more than a month. In the records of destructive Epidemics there can hardly be found a more lamentable history than this. It adds not a little to the horror of the story to know that Cholera hardly existed outside the Cantonments of the Troops,. and that, while our Soldiers were dying by hundreds, the city close by, with its 90,000 people, remained almost entirely free from the disease.

Meean Meer is situated between four and five miles to the south-east of Anarkullee, the Civil Station of Lahore, and the Head Quarters of the Government of the Punjab. Lahore and Anarkullee are situated on the edge of the low ground on the left bank of the Ravee, in the midst of trees and rich cultivation; while Meean Meer, the Military Cantonment, stands on the high land in an arid plain, same forty feet above the river.

For some years after the occupation of Lahore, in 1846, the Troops were stationed in Anarkullee and in the Citadel. The latter was the fortress and palace of the Mohammedan kings and their successors. It stands on the edge of the Ravee, between the river and the closely adjoining city, on ground somewhat higher than the immediately surrounding country.

After the occupation of Lahore, both Anarkullee and the Citadel proved excessively unhealthy. During the six years commencing with 1846-47, the annual mortality among the European Troops averaged 84·61 per thousand. In 1851-52 Her Majesty's 96th Regiment lost 132·5, and the 1st Bengal Fusiliers no less than 218·6 per 1,000 men.* This great mortality was chiefly owing to Fever and Dysentery, but it is clear that it was attributable much less to the climate of the place than to extreme over-crowding of the men in barracks and hospitals, and to the neglect of proper sanitary precautions. Three hundred sick were placed in a hospital calculated to hold one hundred and twenty, and Dr. Bruce reported, in 1849, that the men had not more than one-third of the requisite quantity of space in their barracks.†

In 1850 it was determined to move the Troops, and Meean Meer was selected as the site of the new Cantonment. In the time of Runjeet

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* Dr. Chevers on the Means of preserving the health of European Soldiers in India, p. 165

† Ditto, pp. 374 and 735.

Singh and his successors, Meean Meer was one of the great encamping grounds for the Sikh Army. It was an arid and desolate plain, with no inhabitants, and almost no vegetation. The last ten years, during which it has been occupied by our Troops, have done little to improve its appearance. The Barracks and Hospitals rise out of a dismal-looking desert, in which a tree can hardly be made to grow, and from which, during the greater portion of the year, every green thing is scorched up by the sun. Meean Meer, however, has not been in ordinary years an unhealthy station. It has been often said that during the Sikh rule it was specially subject to Epidemics of Cholera; but there appears to be no foundation for this statement. The first violent Epidemic of Cholera remembered at Lahore is that of 1831, when the mortality in the city was very great. At this time there were no Troops at Meean Meer. In 1842 there was another outbreak of the disease, and the division of the Sikh Army at Meean Meer suffered severely; not, however, more severely than the city of Lahore.

In 1856 there was an exceedingly violent Epidemic of Cholera among our own Troops at Meean Meer. It broke out in the Artillery lines on the 6th August, on the date and almost in the same place at which it first appeared in the Epidemic of 1861. Among the European Soldiers, with a total strength of 1,592 men, there were 495 cases of Cholera, and 265 deaths. In the Central Jail in the city, and in Anarkullee, the disease was also very fatal.

The inhabited portion of the Cantonment of Meean Meer forms nearly a parallelogram, lying north and south, more than four miles long, and about a mile and a half broad. The Native Infantry lines occupy the centre of the ground on its western front. Beyond these, on the north, are the lines of the European Infantry; and on the other side, to the south-east, the lines of the Artillery. At the northern end of the station lies the Sudder Bazar, and the other extremity in the south-west corner of the Cantonment is occupied by a Regiment of Native Cavalry.

Meean Meer stands upon the highest ground in this portion of the Baree Doab. The Canal, which ordinarily follows the water-shed of the country, was carried out of its proper course, in order that it might not pass through the Cantonment. The general slope of the ground is ample, and there would be no difficulty in carrying out a complete system of drainage. One great drain on the east side of the Cantonment runs northwards to the Ravee, some seven miles distant, with a fall, in the first part of its course, of 2·2 feet per mile; while four main drains run north and south, with slopes varying from 3 to 4 feet per mile. The discharge from these drains is calculated to be sufficient to carry off immediately the whole of the rain-fall. Although more has been done than in most stations in the construction of main channels, much remains to be effected to render the drainage complete. The smaller drains to carry off the water into the main channels are insufficient, and water consequently often lies, both in the Artillery and Infantry lines, and especially in the latter, in a manner which is very objectionable.

The barracks and hospitals of Meean Meer are among the largest that have been constructed in India. No expense has been spared upon them, but the plans upon which they are built are very faulty.

Ten large barracks have been built for the Infantry in three chequered lines running north and south. There is an interval of 136 yards between the lines, and in these spaces are the cook-rooms and latrines. Each barrack is 435 feet long by 87 broad, with two verandahs on each side, one of them open, and the other enclosed. The centre portion of the building is 24 feet high. Each barrack is divided into six compartments, each 48 feet long by 24 broad, opening one into the other through open arches. The inner verandahs are connected with the barrack-rooms by lofty arches of four feet span, over each of which there is a glazed window, which can be opened and shut by means of ropes from below. Ridge ventilation is also supplied in each room. Both ends of each barrack are divided off into small rooms, which are occupied by Sergeants. These rooms seriously interfere with the free passage of air through the building. Each barrack was intended for the accommodation of 96 men. This allowed 72 superficial feet, and 2,037 cubic feet of space per man, exclusive of the verandahs.

The erection of twelve barracks was originally sanctioned for the accommodation of one Regiment. Two of these, which were intended for the Band, workshops, reading-rooms, &c., have not been built. There are three barracks for married people. Each of these contains quarters for 20 families, each family being allowed two rooms, one of them 16 by 13 feet, and the other 12 by 13 feet. The rooms are 20 feet high, and well ventilated. The hospital will be described further on.

The barracks and hospital for the Artillery are built almost upon the same plan.

In the Artillery lines, when the outbreak of Cholera took place, there was ample accommodation for the number of men to be provided for. But in the Infantry lines the men were over-crowded. The buildings, both barracks and hospital, which were intended for one Regiment, and were not complete even for this strength, were occupied, at the outbreak of the Epidemic, not only by a full Regiment, Her Majesty's 51st, but by the right wing of Her Majesty's 94th Regiment also. Thus, more than

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,500 men were placed in buildings barely sufficient for the proper accommodation of 1,000. Each barrack which could only properly hold 96 men was occupied by 115. The superficial area to each man would have been only 72 square feet, if the barracks had been occupied by the number of men for which they were designed, and even this allowance is insufficient in a tropical climate. This space was further reduced by the increased number of men in the barracks. It became necessary to place men in the inner verandahs, for there was no other means of accommodating them, and such an arrangement seriously interferes with the ventilation of the main rooms. In buildings constructed upon the plan of these barracks, over-crowding ought especially to be avoided. Under any circumstances, their proper ventilation is difficult, on account of the numerous inner walls and sub-divisions of rooms and verandahs.

The Commission were of opinion that not more than one Regiment ought ever to occupy the present Infantry lines at Meean Meer during the hot and rainy seasons.

In the Infantry lines at the time of the outbreak of the Epidemic, the condition of the latrines was extremely offensive: most of them were constructed on the cess-pool principle. The filth had accumulated in them ever since the establishment of the station ten years before, and it is difficult to imagine any thing more objectionable than their state. The stench from them was at times perfectly overpowering, and the Soldiers themselves often complained that it was almost impossible to enter them. In their Annual Report for 1853-54, the Medical Board quoted the opinion of Dr. Gordon, of Her Majesty's 10th Foot, to the effect that this abominable system "was calculated, in the course of a few years, to induce Epidemics of Cholera and Fever."* Two years after this was written, there was a violent outbreak of Cholera at Meean Meer. Many other representations were made upon the subject, but with no useful result. In March 1859, Dr. Green, Deputy Inspector General of Hospitals, wrote as follows:—"The cess-pool privies erected in the midst of the Barracks, and at no great distance from the walls, are huge nuisances. They were very costly in their erection, so much so as to have attracted the attention of the Home Government, from whom enquiries were sent out as to their suitableness for the purpose, and as to the necessity of such large outlay. Attention has been more particularly called to them during the last year, in consequence of great sickness occurring in one of these barracks, occupied by the 51st, in close vicinity to one of these cess-pool privies, in February and March of this year. The men living in the barrack complained much of the offensive smell issuing from this privy. The barrack was, in consequence, vacated. These privies are, in short, nothing more than huge cess-pools, placed, in defiance of all sanitary rules, in the very midst of the dwellings of the soldiers."

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* Dr. Chevers, p. 488.

These cess-pools were carried down to the water-bearing stratum of the soil, and were about 58 feet deep. In some of them the accumulation of soil was so great that they were filled up to a distance of 23 feet from the surface. It was stated that, during the height of the Epidemic, the smell from these places was "perceptible on calm still nights, in almost all directions, but especially towards the centre of the lines;" and that the air seemed to be everywhere impregnated with the exhalations.

Before the Commission arrived at Meean Meer, these horrible structures had been bricked up, and latrines on the surface principle substituted; but this was only done after the outbreak of Cholera. In the Artillery lines the latrines were on the surface principle, and constructed on the ordinary plan.

To each of the large barracks in the Infantry and Artillery lines is attached a wash-house on the standard plan. Outside the wash-house, and against one of the side walls, urinaries have been built. The same roof covers the whole, and the building is connected with the barracks by a covered way. The refuse water is conducted through pipes into cess-pools, which are only less objectionable than those attached to the latrines. They had never been opened since they were first constructed, and are believed to have been in use since 1854 or 1855. The pipes get constantly out of order; the condition of the buildings is always very bad; and the cess-pools are offensive nuisances. There is nothing in them, however, peculiar to Meean Meer, for similar ones exist in many stations.

The conservancy establishments at Meean Meer are maintained on the ordinary system, and at the ordinary strength. Considerable local funds are also available. The Grazing Fund has an income of about Rs. 3,700 per annum. The greater part of these funds appears to have been spent on the Public Garden and Band-stand, in disregard of the standing orders on the subject, which prohibit expenditure on such "luxuries of the station."*

The filth is removed daily from the latrines, and thrown down upon the ground at two places some hundred yards distant. No attempt is made to bury or otherwise dispose of it. Dead animals and every kind of refuse are accumulated in the same places, which thus become very offensive and dangerous.

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* General Orders, Head Quarters, Simla, 27th June 1859.

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Bad as was the conservancy of Meean Meer when the Commission visited the station, it was far worse before the outbreak of the Epidemic, before attention had been specially called to these matters, and when the abominable cess-pools were poisoning the whole atmosphere of the place. There can be no doubt that the neglect of the commonest principles of sanitary science was such that Cholera or any other epidemic disease would find all the conditions most favourable to its progress. But the Commission did not consider that the conservancy of the place had been neglected by the local Military Authorities in any unusual degree. Bad as the conservancy was, the station was kept in better order than many that were visited.

There are three public necessaries for the use of the Native population. It is a disgusting and almost incredible fact, that the filth from these places has been sold for the purpose of feeding sheep, and that a flock of sheep has been seen to be actually driven into a latrine.

The soil of Meean Meer is a light sandy clay, mixed with sand and kunkur. The supply of water is ample, but since the outbreak of Cholera, there has been much discussion regarding its quality. The water is generally 35 to 40 feet from the surface, and the total depth of the wells is usually about 60 feet. The water contains much carbonate of soda; it is somewhat unpleasant to the taste, and there have been frequent complaints regarding it. This has been chiefly the case in the rainy season. Wells are of course commonly affected by the periodical rains, but apparently the quality of the water at that season suffers at Meean Meer to an unusual extent.

Throughout a great portion of the Punjab, and in other parts of India, the water frequently contains much sulphate of soda, and other salts. This water, although often unpalatable, is not found to be generally unwholesome, at least to persons who have become accustomed to its use. This is sufficiently shown by the fact that the population of these countries is more vigorous and healthy than that of almost any other part of India; nor have we reason for believing that there is anything especially objectionable in the salts contained in the water at Meean Meer. The question has however arisen, whether the water of the wells was not contaminated by percolation from the numerous cess-pools. Two of these were only 118 feet from a well, and others not much more distant. Dr. Brown, the Chemical Examiner at Lahore, made an analysis of the water at Meean Meer, and has given a decided opinion that, in some instances at least, the water of the wells had been contaminated by the cess-pools.

A separate Report was submitted to the Government by the Commission upon this subject. Extracts from this Report and from

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Dr. Brown's account of his analyses are given in the Appendix. They show that although the Commission could trace no apparent connection between the progress of Cholera at Meean Meer and the use of particular wells, there could be little doubt that the water had been in some cases polluted by organic matter from the cess-pools.

The following Table shows the strength of the European Troops at Meean Meer and in the Fort of Lahore, when the Epidemic commenced, with the number of admissions and deaths from Cholera in each Corps :*—

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* In this and subsequent Tables of a similar kind, the Non-Commissioned Officers are included in the Column headed "Men." More minute details are given in the Table at page 4, and in the Tables contained in Section II of the Report of the Commission.

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REGIMENT.	STRENGTH.			CASES OF CHOLERA.						PERCENTAGE.								
				Men.		Women.		Children.		Cases to Strength.			Deaths to Strength.			Deaths to Cases.		
	Men.	Women.	Children.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Men.	Women.	Children.	Men.	Women.	Children.	Men.	Women.	Children.
H. M.'s 51st Regiment ...	1,002	57	79	477	253	28	14	30	22	47·6	49·0	38·0	25·2	24·6	27·9	53·0	50·0	73·3
H. M.'s 94th Regt., Right Wing	546	22	20	245	171	5	4	4	4	44·9	22·7	20·0	31·3	18·2	20·0	69·8	80·0	100·0
H. M.'s late 5th Bengal Cavalry	223	4	3	43	31	...	...	...	...	19·3	...	...	13·9	...	...	72·1	...	...
E. Battery Royal Horse Artillery	183	7	7	19	16	2	2	1	1	10·4	28·6	14·3	8·7	28·6	14·3	84·2	100·0	100·0
Bengal Artillery Division ...	166	20	29	20	14	1	1	3	1	12·0	5·0	10·3	8·4	5·0	3·4	70·0	100·0	33·3
Bengal Artillery, Fort Lahore	54	13	17	2	1	...	...	...	...	3·7	...	...	1·9	...	...	...	...	...
Total ...	2,174	123	155	806	486	36	21	38	28	37·1	29·3	24·5	22·4	17·1	18·1	60·3	58·3	73·7

The following Table gives the strength of the Native Troops, and the number of cases of Cholera among the men :—

Regiment.	Strength.	Cases of Cholera.	Deaths.	Percentage.		
				Cases to Strength.	Deaths to Strength.	Deaths to Cases.
15th Bengal Cavalry ...	345	32	15	9·3	4·3	46·9
31st Regt. Native Infantry	320	9	5	2·8	1·6	55·6
Total ...	665	41	20	6·2	3·0	48·8

The Native population of Meean Meer is chiefly collected in the Sudder Bazar, but each Regiment has its own small Bazar also. The total number of inhabitants was estimated at 10,333, of whom 6,546 were Hindoo, and 3,787 Mohammedan. Among the former, 81 deaths are reported to have occurred, and 47 deaths among the latter.

Cholera in an epidemic form had shown itself in Delhi and in the neighbouring districts more than a month before it reached Lahore. Some attempts were made to clear away the grass that obstructed the drains of the Cantonment, and some orders were issued regarding the conservancy of the Bazars, but practically no measures of precaution were taken that deserve to be noticed. The Civil Authorities in the neighbouring station of Anarkullee showed themselves more alive to the danger. "On Cholera being reported," writes Dr. Smith, the Civil Surgeon, to have broken out in the Delhi district, the Civil authorities at Lahore at once took steps to improve the sanitary condition of the station and the city. A circular was issued, calling upon the residents to assist in this work, and warning them of the probable approach of the disease. Stringent orders were issued to remove all accumulations of filth and refuse matter. Drains were cleared out, and their levels adjusted; all weeds and rank vegetation rooted up and burned; hollows filled up; the trees thinned, and their branches lopped to the height of ten feet from the ground, to allow a free circulation of air. The cleanliness and drainage of the city and bazar were also particularly attended to. The city was divided into sections for the purpose of Medical supervision, and placed under the immediate supervision of three Sub-Assistant Surgeons. Under these the most intelligent of the pupils of the Medical College were told off to do duty. The Hukeems of the city would have also

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been employed. I published a pamphlet in the vernacular, describing the disease and its treatment, which was circulated throughout the division for the use of the Hukeems and Natives employed in treating the disease. Supplies of medicines were ready prepared for distribution to all the Thannas and Police chowkees, to the city, or wherever the Cholera might appear. On the first outbreak of the disease at Meean Meer, I requested the Deputy Commissioner to have a record kept of all the funerals that passed through the city gates daily, with the reputed cause of death in each case. The city was inspected, morning and evening, by two Sub-Assistant Surgeons. It was also visited daily by myself, the Deputy Commissioner and his Assistants, and the Police Officers, so that no prevalence of the disease could escape notice. Sporadic cases continued to occur from the 12th of August till the end of the month, but the disease was confined to no special locality, and never assumed an epidemic form. In all about 20 or 25 deaths occurred. It was remarkable that the first cases that came under our notice were in persons who were employed at Meean Meer during the day, returning to their houses in the city at night. In Anarkullee only one case occurred in the European population, and this was in a woman who had acted as nurse to a lady and her child, both of whom died of the disease in Meean Meer. She was seized the day after her return home, and had all the formidable symptoms of the disease, but recovered. On the appearance of the Cholera at Meean Meer, I instituted regular house-to-house visitations in Anarkullee, and I have no doubt, by thus keeping all under observation, in two or three cases, warded off the disease."

The precautionary measures taken by Dr. Dallas, the Superintendent of the Central Prison of Lahore, were equally excellent. This great establishment, containing more than two thousand prisoners, is altogether admirably managed. The conservancy may be called perfect. The contrast was great between the sanitary arrangements made for these 2,000 prisoners, and those made for about the same number of European Soldiers at a distance of three or four miles. The mass of abominations in the shape of cess-pools and latrines among which the Soldiers had to live has been described. In the Central Prison it is hardly possible to discover an offensive smell, even in the latrines that are in constant use. The account given by Dr. Dallas, of the precautionary measures taken by him in anticipation of an outbreak of Cholera, is full of interest. The system upon which he acted is evidently the only rational one, and the principles on which it is founded are just as applicable to European Soldiers as to prisoners in Jails.

"In June and July," writes Dr. Dallas, "Cholera was prevailing in the Delhi districts, and was approaching Umballa and Thaneysur

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steadily. I was impressed with the firm conviction that this station would not escape, and I decided on the measures I should take if this Jail were visited by the disease. I determined on moving all the prisoners into camp immediately on its appearing among them. With this view, early in July, I demi-officially communicated with Captain Norman, Deputy Quarter Master General of the Army, in order to ascertain his capacity for supplying me with tents. From him I learnt all I wished to know; but I took no decided steps at that time, except to issue extra blankets to the old, infirm, and sick in Hospital, as there was much rain at the time. On the 27th of July, seeing the disease steadily approaching, I applied for orders to be issued to Captain Norman to supply me with tents when I should ask for them. I then made all arrangements in the Jail for moving at once if necessary. I separated the old and infirm; lessened their work and kept them under close surveillance; established gangs for cleaning the Jail; had all refuse matter and filth removed three times a day; all jungle cut down, and collections of water drained off. Early in August, I think the 6th, the disease appeared at Meean Meer. I then applied for leave to issue a more stimulating and generous diet, and ghee was issued; the convicts were kept half an hour later in their barracks of a morning; the work throughout the whole Jail was lightened. In each ward I set a man I could trust to watch the health of the others; the sweepers were ordered to report if any one attracted their notice as suffering from diarrhœa; the cooking pans were examined and placed in good order; the wells were examined and cleaned. The Native Doctors and myself arranged to take prisoners in certain portions of the prison every morning, so that every man might be seen daily; medicines were carried round by each of us, and given at once. If deemed necessary, the man receiving it was sent to hospital, and the number in each barrack was reduced so as to avoid any approach to over-crowding. Only one case of Cholera occurred in the prison, and the patient recovered.

It is necessary to state, briefly, the sanitary condition of the Troops at Meean Meer when the Cholera appeared.

The majority of the men of the 51st Regiment were described by the Surgeon of the Regiment to be deficient in muscular development and constitutional strength. The Regiment landed at Kurrachee from Ireland in February 1858, and reached Meean Meer in December of the same year. During the last two years there had been no great amount of positive disease, but the men had been generally weak and unfit for hard work. There was no prevalence of diarrhœa or other disease until about a fortnight before the appearance of Cholera, when cases of slight diarrhœa became common.

The 94th Regiment landed at Kurrachee in January 1858, from England. They reached Rawul Pindee in April, and Peshawur in August of the same year. They remained at Peshawur and Nowshera until the end of 1859, and they arrived at Meean Meer in March 1861. They suffered a good deal from fever in the Peshawur Valley. Previously to the appearance of Cholera, the health of the men at Meean Meer had been tolerably good. Diarrhœa was somewhat prevalent immediately before the outbreak, and this was more or less the case with all the Troops at the station. The men of the Royal and Bengal Artillery were generally strong and healthy.

Minute inquiries were made with the object of ascertaining whether the habits of the men, their diet, their clothing, or their duties, had exercised any apparent influence upon the outbreak of the disease. No immediate connection of the kind could be traced.

The general meteorological phenomena before and during the Epidemic have been noticed in the Second Section of the Report of the Commission. The accompanying Diagram shows the temperature, rain-fall, and direction of the wind on each day during the prevalence of the Epidemic. But these meteorological details deserve little confidence, and no conclusions can be based upon them. The reasons for this opinion are given in paragraphs 340 to 343 of the Report of the Commission.*

The first undoubted case of Cholera at Meean Meer occurred in the lines of the Native Cavalry on the 31st July. Nothing could be discovered to show that there had been any communication between the persons first attacked and others who had come from places where Cholera had been prevalent. Between the 31st July and the 6th August, there were several cases among the men of the Regiment and the camp-followers; and cases are also said to have occurred in the Artillery Bazar.

On the 6th August, the first European Soldier was attacked. He was a man belonging to No. 1 Company of Her Majesty's 51st Regiment, which then occupied the Reserve Company Barrack in the Artillery lines. On the 8th, a second case occurred in the same barrack; and on the same day, a man belonging to the 1st Troop, 2nd Brigade, Horse Artillery, who was in hospital, suffering from Orchitis, was attacked. On the 9th August, three more men of the Artillery were attacked in No. 1 Reserve and No. 2 Barrack; and on the same day, another case was admitted from No. 1 Company of the 51st Regiment. These cases among the men of the 51st were all removed for treatment to the hospital in the Infantry lines. Hitherto, the disease had been confined to

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* The paragraphs of the Report to which reference is here made will explain why so little has been said in any part of this Narrative regarding meteorological phenomena.

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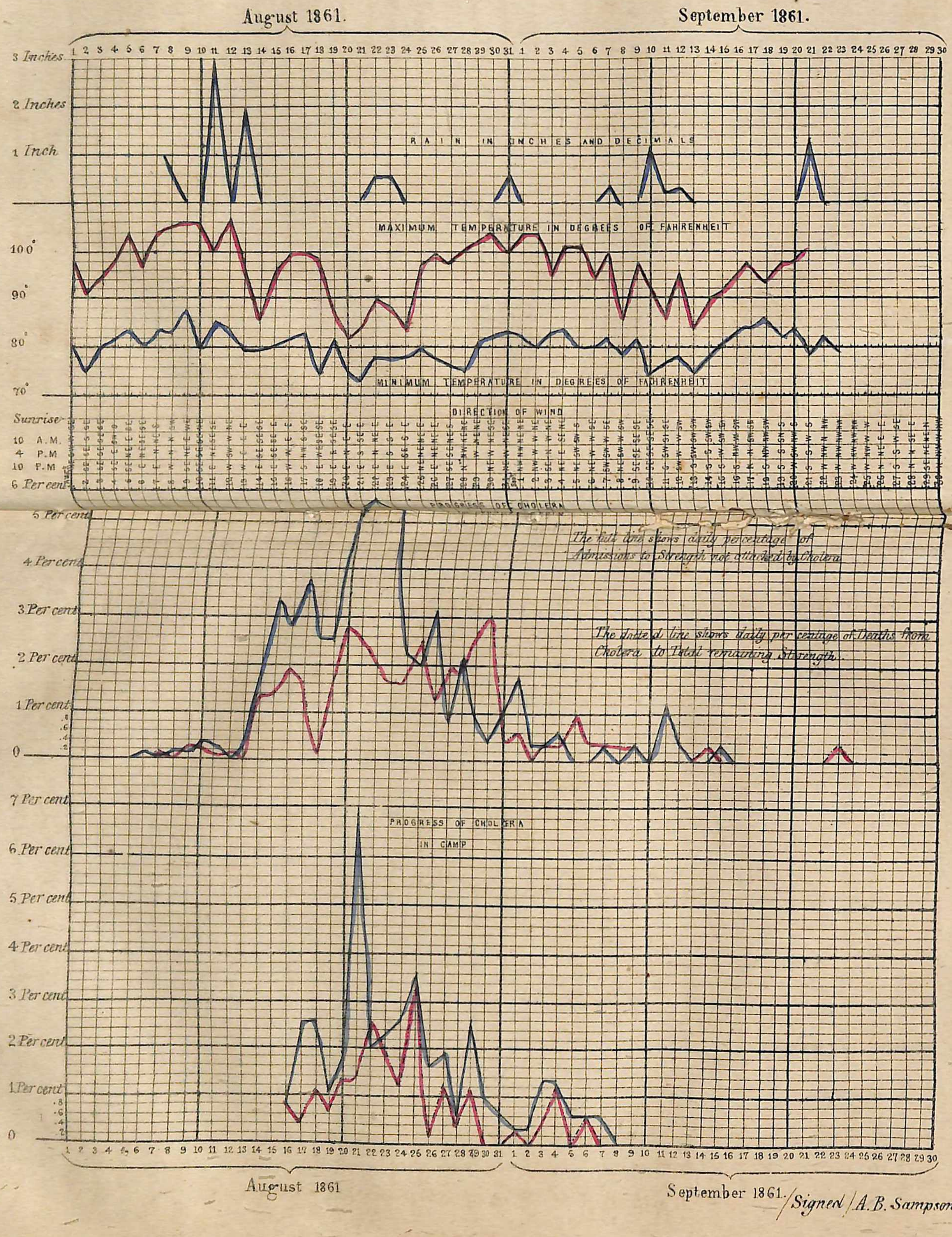
DIAGRAM.

Showing the daily progress of Cholera in H. M. 51st. Regt. (men only) in Cantonments Mecan Meer and in Camp; also Temperature, Rain fall, and Wind.



The full line shows daily percentage of Admissions to Strength not attacked by Cholera

The dotted line shows daily per centage of Deaths from Cholera to Total remaining Strength.

/Signed/ A. B. Sampson.

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the Southern end of the Cantonment, but on the morning of the 10th August a case occurred in the Infantry lines in No. 8 Barrack, occupied by the 94th Regiment. It must be noticed that this barrack is next to the hospital : but no communicaton between its inmates and any of the Cholera patients could be traced. On the same day, three more cases occurred in the Troop of Artillery occupying No. 2 Barrack, and a man belonging to the E. Battery, Royal Horse Artillery, who had been under treatment for diarrhœa for four days, was attacked in hospital. All these cases proved rapidly fatal.

On the 9th August, as the Infantry lines were free from the disease, it was recommended that the Company of the 51st Regiment which occupied the Artillery Barrack should be removed to their own quarters. On the evening of the 10th August, this measure was carried out, and the Company moved into No. 4 Barrack in the Infantry lines. Shortly after their arrival, three of the men were attacked with Cholera.

Thus, in the five days, since the first appearance of the disease in the lines of the European Soldiers, fifteen cases had occurred, and all of these were fatal.

From the first appearance of the disease among the European Soldiers, Surgeon Major Harper, in charge of the Bengal Artillery, had urged the necessity of adopting the sole measure of precaution which his long Indian experience had shown him to deserve any confidence,—the immediate removal of the Troops from the localities that had become infected with the disease. Unfortunately, his advice was not followed.

Cholera continued to increase, and, on the 14th August, it had attacked every European Regiment in the Cantonment. On the 14th there were 26 fresh cases, most of which proved fatal.

On the 15th there was an alarming increase in the disease. There were 27 fresh admissions in the 51st Regiment, 10 in the 94th Regiment, 2 in the 5th Cavalry, and 2 in the Bengal Artillery.

The question of moving the Troops was now again brought forward, and, on the 15th August, Dr. Green, Deputy Inspector General of Hospitals, made a strong recommendation to General Ferryman that the men should be moved into camp as soon as the necessary arrangements could be made. In accordance with this advice, an order was issued to the effect that the 1st Troop, 2nd Brigade, Bengal Horse Artillery, should march to Shahdera, and five Companies of the 51st Regiment to Chubeel, with as little delay as practicable.

From the commencement of the Epidemic, Captain Norman, Deputy Assistant Quarter Master General of the Division, had been most desirous that the troops should be moved into camp, and active measures had been taken by him, in communication with Mr. Egerton, the

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Deputy Commissioner of Lahore, for determining beforehand what places were the most suitable for encamping grounds. Owing to the heavy rain, the country all round was under water, and no dry places were accessible for wheeled carriage, except those that were situated near the main roads from Meean Meer.

Chubeel, a village about ten miles distant, on the road from Lahore to Amritsur, was selected as the first encampment for the 51st Regiment. The ground in the neighbourhood was high, and there was a Serai there, built for the shelter of travellers, that could be made available for the shelter of the sick. The road from Meean Meer to Chubeel is metalled throughout. The men could thus march without inconvenience, and carts could travel without difficulty.

Shahdera is on the right bank of the Ravee, opposite the city of Lahore, and about ten miles from Meean Meer. The tomb of the Emperor Jehangeer stands here in the midst of gardens, a great pile of buildings, affording good shelter for troops.

Shahdera is situated on the low ground close to the river. The vegetation at this season of the year was rank; much of the surrounding country was under water, and the place had the reputation of being especially liable to attacks of intermittent fever. On these grounds some objection was made to the choice of Shahdera as an encampment. Dr. Harper, however, considered that the sole object in view was to find an immediate place of refuge from Cholera; the risk of possible exposure to other sources of disease he thought of little importance under such circumstances. The result showed that Dr. Harper had been right. If a similar course had been followed with the rest of the Troops, it is probable that the calamity that was about to fall upon Meean Meer might, in a very great measure, have been avoided.

On the morning of the 16th August, everything being ready for the march, the Troop of Artillery moved to Shahdera. The buildings were given up for the accommodation of the men. Punkhas were put up, and the men's beds were arranged in the arcades that surround the tomb.

On the following day one case of Cholera occurred at Shahdera. It did not prove fatal. There can be no reasonable doubt that this case really had its origin in Meean Meer. From this time forward there was no case of Cholera in the Troop, while at Meean Meer the pestilence every day gained fresh virulence.

On the 16th August three Companies of the 51st Regiment marched to Chubeel. In consequence of some mismanagement, the march of the two other Companies that had been ordered to start

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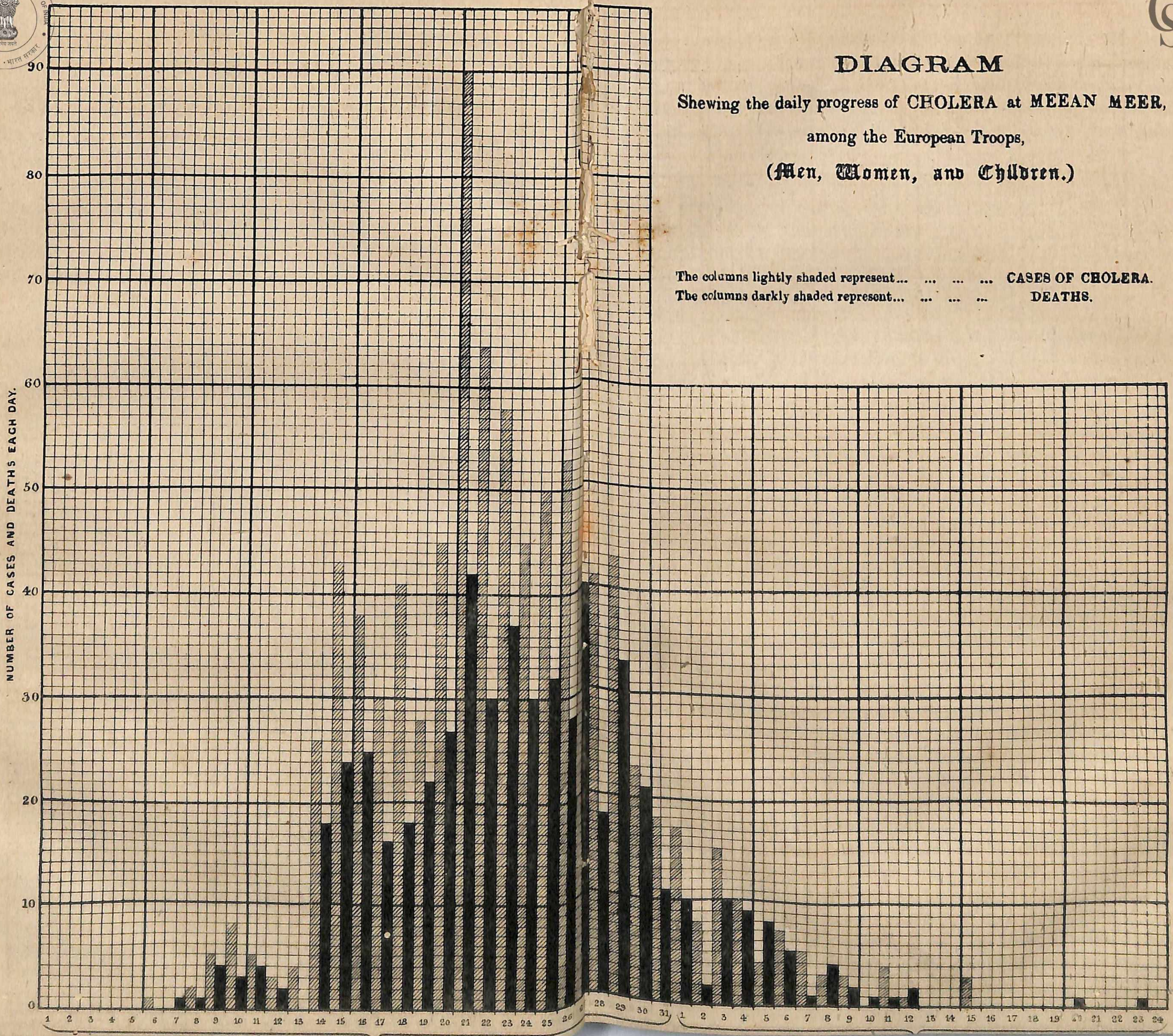
DIAGRAM

Shewing the daily progress of CHOLERA at MEEAN MEER,

among the European Troops,

(Men, Women, and Children.)

The columns lightly shaded represent... ... ... CASES OF CHOLERA.
The columns darkly shaded represent... ... ... DEATHS.



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at the same time was delayed until the following day. They then marched also to Chubeel. Regarding the movements of these detachments, and the progress of the disease among the men that composed them, it will be convenient to give a connected account further on. It is desirable first to proceed with the narrative of events in the Cantonment of Meean Meer.

The accompanying Diagrams will show, in detail, the terrible mortality among the Soldiers which now commenced. In the ten days that followed the 16th August, 457 men were attacked with Cholera, and 261 died. In the 51st Regiment, during this time, there were 256 admissions and 126 deaths. In the 94th Regiment, out of a strength of 487 men, 151 men were attacked and 97 men died.

All the sanitary defects which have been described as existing in the Meean Meer Cantonments when the disease appeared, were, apparently, quite insignificant in comparison with those which were created during the actual presence of the Epidemic. After the 15th August, the disease increased with such frightful rapidity that the soldiers, in a few days, were panic-striken and hopeless. The condition of the hospitals in the Infantry lines became truly horrible. There can be little doubt that to these hospitals was attributable, in a very great degree, the frightful mortality that occurred, and some description of them must therefore be given. The history of the hospitals becomes, indeed, henceforth almost the history of the Cholera at Meean Meer.

The hospital stands at the north-western extremity of the Infantry lines. It consists of a long line of buildings, facing east and west, more than seven hundred feet in length. This is divided into two great wings, each 308 feet long, and between these are the Dispensary and Medical Store-rooms. The centre portion of the building is thrown back about 80 feet, and is only connected with the wings by a covered verandah or arcade. Thus, an open space, 90 feet broad, is left, except on one side, between the two main divisions of the building. These are upon the same general plan as that of the barracks. Each wing is divided into five compartments, which communicate with each other through open arches, 17 feet high and 10 feet span. Thus, the whole forms one large ward. Each compartment is 48 feet long, 24 feet wide, and 24 feet high. At the northern and southern ends of the ward there are four small rooms, each 18 feet long by 12 feet broad. Along both sides run enclosed verandahs, 17 feet high and 12 feet wide, communicating with the main ward by three open arches in each compartment, 14 feet high and 4 feet span. Outside this enclosed verandah, there is an open verandah 10 feet broad. The wards are ventilated

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by windows above each of the side arches, and by openings in the ridge of the roof. The latrines are placed, one for each wing of the hospital, at a distance of 40 yards from the north and south ends of the building, with which they communicate by covered passages. The dead-house is at the north-east corner of the hospital enclosure, about 50 yards from the main building. Each of the large wards was intended to hold 80 patients, or 16 in each compartment. This allows to each patient 72 superficial feet, and 1,980 cubic feet of space. The ventilation of the wards is seriously interfered with by the small rooms at the end of the building, and by the double verandahs on both sides. There can be no question that, in a hospital so constructed, the allowance of 72 superficial feet to each patient is insufficient. The Surgeon of the 51st Regiment recorded his opinion, that each ward ought not to contain more than 60 patients, or 12 in each compartment; and there can be no doubt that if the numbers ever exceed this, the hospital is objectionably over-crowded. This would give to each patient 96 superficial feet, an allowance rather below than above what is desirable.

The whole of the buildings were originally intended as the hospital for one Regiment, and they are certainly not more than sufficient for this number of men. They were, however, made to serve for the accommodation of the sick of a Regiment and a half, and the Regiment which ought to have had the use of the whole building was confined to half of it. The south wing was occupied as the hospital of the 51st Regiment, and the north wing by the hospital of the 94th.

When the Epidemic of Cholera commenced on the 6th August, there were 60 patients in the hospital of the 51st Regiment. The principal diseases were fever, venereal affections, and ophthalmia. Thus, according to the opinion which has just been expressed, the hospital was on that day full. Considering that there are no means of separating and classifying patients, and that the whole of the five compartments form in fact only one large ward, it was in reality more than full, and there were no means for giving accommodation to a fresh influx of patients suffering from such a disease as Cholera. Into this building, however, all the Cholera patients were brought. It was not until the 15th August that any attempt was made to provide more room. On that date four tents were pitched close to the hospital, and 20 patients were moved into them in the afternoon of the same day. These tents were occupied until the 22nd August.

If the figures showing the daily number of patients under treatment had represented the total number of men in the hospital, the building would even then have been greatly over-crowded. Unless abundance of space and fresh air be afforded, the atmosphere of a hospital containing

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many Cholera patients soon becomes objectionable and dangerous. But the number of men actually in the hospital was very much greater. In accordance with the ordinary custom, of which the unfortunate results were noticed at many other stations, every patient attacked by Cholera was attended by several of his comrades, who were told off to perform the duty. Three or four men were thus employed in administering to the wants of each patient.' During a great part of the time that the Epidemic lasted, 160 men were told off daily for this duty. Besides these orderlies, there were the numerous hospital attendants, sweepers, punkha-coolies, and others, to swell the numbers in the building. After the 15th August there were probably, including patients, seldom less than 150 men in a building that could only properly accommodate 60 patients.

The other wing of the building, occupied as the hospital of the 94th Regiment, was less crowded, because the sick of only half a Regiment had to be accommodated in it. On the other hand, no patients were treated in tents, and there was not much to choose between the two portions of the building in this respect when the disease became virulent.

Orderlies were supplied in the same manner as in the hospital of the 51st Regiment.

For several days before the 21st August, the condition of these hospitals had become so bad, that no description can possibly exaggerate it. The subordinate establishments and attendants were in a great measure paralyzed with fatigue. The Medical Officers were constantly in the hospitals night and day, and their labours were unceasing. But their efforts were, in a great measure, thrown away. Every remedy proved equally useless. The arrangements for the preservation of cleanliness in the hospital completely broke down; the sweepers were worn out with work, and under no supervision. The frightful results in a hospital filled with Cholera patients may be imagined. The building became literally saturated with filth, and the ground outside was often little better, for the sweepers, to save themselves labour, threw down, within the hospital enclosure, the contents of the vessels which ought to have been carried to a distance. When the wind blew from the hospitals, the horrible penetrating odour that issued from them was clearly perceptible at a distance of eighty yards from the buildings. Inside the hospitals the state of the atmosphere was frightful, and the scene which they presented was one which, in every element of horror and misery, it would be hardly possible to surpass.

Into these pest-houses—for such they had become—the soldiers were sent, either as patients or as orderlies, in constantly increasing numbers. Some people may think that this accumulation of Cholera patients

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in places where the atmosphere and the ground, and the walls, and the furniture, were polluted either with actual Cholera excreta, or with the exhalations from them, may, so far as physical causes are concerned, have exercised no greater influence on the diffusion of the disease than an equal accumulation of filth of any other kind would have exercised. The supposition is not a probable one but; granting it, and putting aside every question of contagion or communicability of the disease, it is impossible to conceive a state of things more certain to aggravate the ravages of an Epidemic than this which existed in the Infantry Hospitals of Meean Meer. If the men had been shut up in the worst latrines of their own station, over the horrible cess-pools which have been described, they would have been, perhaps, in a purer atmosphere than that which they had to breathe in these hospitals.

Out of a total strength of 1,002 men in the 51st Regiment, it is stated, in the Regimental Returns, that 863 were employed as hospital orderlies, and that 428 of these men were attacked with the disease. In the 94th Regiment, a very large proportion of the men attacked had been employed in the same manner. According to the Returns supplied to the Commission, out of 230 cases of Cholera, 137 occurred among the hospital orderlies.

It would have been very interesting to have been able to make a fair comparison between the liability to attack which these men suffered with that of men who underwent no exposure of the kind. But this could not be done, because the Commission were unable to satisfy themselves what men had really never been employed on hospital duty.

During the height of the Epidemic, 160 orderlies appear to have been usually sent to the hospital every day—100 men from the 51st, and 60 from the 94th Regiment. Half of this number were constantly on duty during the day, and the other half during the night. The work was very laborious and depressing: on an average, each man had less than two nights in bed. Thus, to all other physical and moral influences likely to cause disease, was superadded the aggravation of extreme fatigue. There was also frequently much irregularity and delay in supplying the men employed in hospital with their meals.

It was natural that, under such circumstances, the men should look forward to employment in the hospitals as to almost certain death. They told, at Meean Meer, the story of a man who, when his turn of duty in the hospitals came round, bade his friends in the barrack farewell, and went off, saying, that although he had then no symptoms of the disease, he knew that he should never see them again. When he entered the hospital, overcome with the frightful scene before him, he lay down on the ground by the bed-side of the man that he was appointed to watch,

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and remained there until the Cholera seized him, and he was himself placed on the bed from which his dead comrade had been removed. This story may be true or false, but it serves to illustrate the actual feelings which were prevalent at the time among the men. Yet no word of objection was heard to the performance of the duty assigned to them, and at this terrible time they worthily maintained the honor of British Soldiers.

This dread of the hospitals led also to that other unfortunate result which was observed at many stations. No measures deserving notice were adopted for the treatment of premonitory symptoms of the disease in the barracks. Men would not apply for Medical aid when they knew that the result of such application would be treatment in a hospital, from which it was unlikely they would ever come out alive. The consequence was, that they received no Medical treatment in the only stage of the disease in which treatment was of any use; and when they were brought into hospital with Cholera, it was too late, in a large proportion of cases, to hope to save them.

It was impossible, in a hospital so constructed, that there should be any effectual separation of Cholera patients from those suffering from other diseases. The consequent condition of the ordinary sick, during the prevalence of the Epidemic, was very lamentable.

The extraordinary degree to which patients in hospital with other diseases were attacked by Cholera at almost every station, has been specially noticed by the Commission in the second Section of their Report.

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Excluding the 51st Regiment, regarding which the Commission could not satisfy themselves, the following Table shows the manner in which patients under treatment for other diseases were attacked by Cholera at Meean Meer during the prevalence of the Epidemic:—

REGIMENT.	Average Healthy Strength per diem.	Average No. per diem of Patients in Hospital with diseases other than Cholera.	Cases of Cholera admitted from Healthy Strength.		Cases of Cholera admitted from Hospital Patients.		PROPORTION PER CENT.						Detail of diseases from which Hospital Patients were suffering when attacked by Cholera.		
							Admissions to Strength.		Deaths to Strength.		Deaths to Cases.				
			Admissions.	Deaths.	Admissions.	Deaths.	Healthy Strength.	Hospital Patients.	In Cases admitted from Healthy Strength.	In Cases admitted from Hospital Patients.	In Cases admitted from Healthy Strength.	In Cases admitted from Hospital Patients.	Disease.	Died.	Recovered.
H. M.'s 94th Regiment, 5th Aug. to 15th Sept.	371	34	231	160	14	11	62·3	41·2	43·1	32·4	69·3	78·6	Venereal diseases... Hœmoptysis ... Dysentery ... Diarrhœa ... Colic ... Fever ...	... 1 1 6 ... 3	2 ... ... 1 ...
Late 5th Bengal Cavalry ..	187	13	40	29	3	2	21·4	23·1	15·5	15·4	72·5	66·6	Venereal diseases... Diarrhœa ... Debility ...	1 ... 1	.. 1 ...
E. Battery, Royal Horse Artillery	160	14	14	12	5	4	8·8	35·7	7·5	28·6	85·7	80·0	Dysentery ... Diarrhœa ... Debility ...	1 3 ...	 1
Bengal Artillery Division ...	148	8	14	10	6	4	9·5	75·0	6·8	50·0	71·4	66·6	Venereal diseases... Paronychia ... Dysentery ... Diarrhœa ... Fever ...	1 1 1 ... 1	1 ... ... 1 ...
Bengal Artillery, Fort Lahore..	51	3	1	..	1	1	2·0	33·3	...	33·3	..	100·0	Dysentery ...	1	...
Total, 5th Aug. to 15th Sept.	**917**	**72**	**300**	**211**	**29**	**22**	**32·7**	**40·3**	**23·0**	**30·6**	**70·3**	**75·9**	**Total** ...	**22**	**7**

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It will be observed that the patients in hospital were far more liable to the attack of Cholera than the men generally. This was true in every case except in that of the 94th Regiment, in which, although the hospital patients suffered to a most excessive degree, the rest of the Regiment suffered still more severely. This comparative escape,—if indeed, we can speak of escape when more than 40 per cent. of the patients were attacked by Cholera,—is perhaps not difficult to understand. Considering the nature of the fatiguing and harassing duty to which almost every man was exposed in the hospital, it was not strange that patients with other diseases, lying quietly in their beds, should suffer in a smaller degree. They had to breathe the same pestilential atmosphere, but they were at least spared the labour and fatigue and want of rest; nor were they brought into such immediate contact with patients attacked by Cholera.

It is hardly necessary to enter into further description of the condition of the Infantry Hospitals when matters were at the worst. The disorganization was complete. Even the essential duty of providing a clean bed and clean bedding for every patient was, in the hospital of the 94th Regiment, sometimes neglected. Men were brought into the hospital attacked with Cholera, and were laid down upon the same beds and upon the same bedding from which dead bodies of other patients had only lately been removed. When we think of the nature of the disease, it is hardly possible to conceive more horrible treatment.

On the 22nd August, measures were taken for obtaining more hospital accommodation. On the previous day, the disease had reached its climax. On it, there were altogether, among men, women, and children, at Meean Meer and in camp, no less than 90 admissions and 42 deaths.

On this day, the 21st August, the indefatigable Chaplain of Anarkullee, the Reverend C. Sloggett, visited the Cantonment, and with his account of what he saw, this part of the description of the hospitals of the 51st and 94th Regiments may be closed.

"I find," writes Mr. Sloggett, in a letter to the Commission, "no particular record of my visits until the 21st August, when the state of the hospitals in the 51st, and still more in the 94th, had become truly appalling. By this time, the men had become so weakened by their incessant duties as attendants on the sick, that few of those engaged escaped an attack; and this, in most cases, proved fatal. The poor fellows did their best, but they evidently felt that there was every chance of their being attacked themselves, and some of them were depressed accordingly. To the best of my recollection, the Cholera patients were still kept in the inner verandahs of the wards of the 51st hospital, while

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the other patients were in the centre; but in the 94th hospital, all the Cholera patients had been separated from the others, and placed in the end ward. This was separated and shut off from the other wards by an immense purdah, which filled up the whole centre arch. Within the Cholera ward were collected some twenty-five patients, all in the worst stage of the disease. Two or three were dying; one had just died; there was almost no ventilation, from the stoppage of the large archway mentioned above; each patient was waited on by three or four men, all of whom were smoking to keep away the horrible smell, and the whole scene was one of the most sad and lamentable I ever witnessed, and such as I hope never to see again. The concentrated smell of the Cholera, (a thing I had not previously noticed to any remarkale degree,) so pungent and oppressive, that, even on entering the ward, I could hardly bear it; the cries, the groans, the shouting, formed together such a combination of horrors as no healthy man could long have lived in, much less could the patients hope to escape."

Let it be remembered that this room was never intended for more than sixteen ordinary patients, and that it could not properly contain more than twelve; and that all this was going on in the tropical heat of August, when the thermometer rose nearly every day to 100°.

On the 23rd of August, Colonel Irby, who commanded the 51st Regiment, died of Cholera. He had been constantly in the hospitals, encouraging and comforting the sick, and it cannot be doubted that he fell a victim to his zealous and indefatigable labors. He was greatly lamented by all, for all had admired and respected him, and his death increased the general feeling of gloom and discouragement.

On the 15th August, Dr. O'Nial arrived, and he immediately assumed Medical charge of the 51st Regiment. He reached Meean Meer when Cholera was already virulent, and when the disorganization of all hospital arrangements had made great progress. Under circumstances of great difficulty, he exerted himself to put matters on a better footing, and the improvements that were at last made were due to him. On the 21st August, he urged the necessity of obtaining more hospital accommodation. On the following day, No. 8 Barrack, next to the hospital, was vacated by the men of the 94th Regiment, and the cases of general disease were moved into it, from the hospital, on the same day. On the 24th August, 45 convalescents from Cholera were moved from the 51st hospital into No. 2 Barrack. On the 25th August, the hospital was abandoned altogether by the 51st, and two days later by the 94th. So disgusting was its condition, that several days after the building was vacated, it was hardly possible to enter it. There was great difficulty in prevailing upon the coolies to clean the place, and many of them were seized with violent vomiting during the work. Every part of the building, every door, and punkah, and rope, is described as saturated with the horrible odour. Subsequently, five other barrack-rooms which had been vacated by the Troops marching into camp, were used at different times as hospitals, and ample space for the treatment of the sick became available.

This account of the Meean Meer hospitals applies only to those in the Infantry lines. In the Artillery Hospital, the cases of Cholera were comparatively few. Hospital orderlies were supplied upon the ordinary system, but although almost every man was so employed, they were not exposed to the same fatigue as in the Infantry Hospitals. The same remarks are applicable to the hospital of the 5th Cavalry. It deserves notice, that out of a total of 43 cases in this Regiment, seven men were attacked while actually employed on orderly duty in the hospital. Two of them were Hospital Sergeants.

On the 16th August, instructions of the most positive character were sent by Telegraph to Meean Meer, by order of His Excellency the Commander-in-Chief, insisting upon the necessity of the treatment in barracks of the premonitory symptoms of Cholera, and directing that cases of diarrhœa should be treated separately in a distinct ward of the hospital. Nothing deserving notice appears to have been done in this matter in the hospitals of the 51st and 94th Regiments. In the Royal Horse Artillery, a separate convalescent ward was formed by Dr. Webb, in which slight cases of diarrhœa were treated, and medicine was given to the Sergeants for distribution in barracks. These measures were taken by Dr. Webb, because he found that patients in the regular hospital were specially liable to be attacked.

In the Bengal Artillery, Dr. Harper ordered that a pill containing quinine and gentian should be given to every man twice a day. In the 5th Cavalry, measures were also taken by Dr. McRae for giving prophylactic medicine, and a convalescent list was kept in the barracks of men who were excused from duty.

On the 23rd August, when the lamentable results of the employment of the European Soldiers as orderlies in the hospitals had become very manifest, it was suggested that the men of the 31st Regiment of Native Infantry might give assistance in those duties. About half of the men of this Regiment were Sikhs, and the rest were mostly Mussulmans of the Punjab. There were about 330 men present when the Cholera commenced, and when it became virulent, they furnished nearly all the guards supplied in ordinary times by the European Troops. From the 24th August, 30 men were sent every day to the Infantry Hospitals to assist in attending on the sick. They proved of little use, not through any

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fault of theirs, but because no proper arrangements were made for their supervision. No case of Cholera occurred among them.

The exemption from attack of the Medical Establishments in the Hospitals was remarkable. There were very few cases of Cholera among them, and hardly any of the native menial servants appear to have suffered.

It is not necessary to trace, day by day, the progress of the Epidemic. This is shown sufficiently by the accompanying Diagrams.*

The investigations made by the Commission for the purpose of ascertaining how particular parts of the Cantonment, or particular subdivisions of Regiments, or classes of men, suffered from the disease, or escaped its attack, led to very little result, and it is hardly possible to judge of the effect at Meean Meer of any predisposing causes of a general character. It appears probable that the effect of all such causes was insignificant in comparison with that of the special cause created by the condition of the Hospitals, and the exposure of the men within them. Under this artificial aggravation, the disease became a furious and uncontrollable pestilence.

The troops at Meean Meer ought clearly to have been moved into camp when the Epidemic became virulent. This course was advised by His Honor the Lieutenant Governor, and by Mr. McLeod, the Financial Commissoner, but unfortunately it was not adopted until much time had been lost. Had the Cantonment been abandoned when the Epidemic commenced, it is probable that several hundred lives would have been saved.

The removal into camp of the Troop of Bengal Artillery, and of a detachment of the 51st Regiment, on the 16th and 17th August, has already been noticed. In consequence of objections and discussions that were raised further movements of the European Troops were for some time suspended, but the extreme virulence of the Epidemic gradually forced upon the Authorities the adoption of the measures in which alone any real advantage was to be found. The movements that were carried out and the results which followed them will now be described. On the 19th August, the 15th Regiment of Native Cavalry marched, on the recommendation of Dr. Baillie, who found that the disease was rapidly increasing, to a place two miles to the west of Shalimar, about seven miles from Meean Meer. During the three following days, a good many fresh cases occurred, chiefly among the camp-followers, but after

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* For the Diagrams which bear his signature, the Commission were indebted to Mr. A. F. Sampson, Assistant Secretary, Department of Public Works.

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the 23rd, when the Regiment changed ground, there were no more cases. Thus the result of the move was most successful. On the 29th August, as it was considered that the disease had entirely ceased, the Regiment returned to Cantonments. This move was not a prudent one, but although one or two cases of Cholera occurred, there were no more deaths.

On the 22nd August, the Company of Bengal Artillery marched to Shahdera, and joined the Troop already encamped there. On this and the three previous days there had been five cases in the Company at Meean Meer, four of which were fatal. On the 26th August, a man of the Company was attacked at Shahdera with Cholera, but he had been suffering from severe diarrhœa for five days before he left Meean Meer, and Dr. Harper justly concluded that this case did not have its origin in camp. After this the disease entirely ceased.

The E. Battery of Artillery marched from Meean Meer, on the night of the 22nd August, to Choong, the first encamping ground on the Mooltan road. On this and the four previous days, there had been eight cases of Cholera, three of which occurred among patients in hospital. On the 23rd there were two fresh cases in camp. Heavy rain fell, and the ground became so flooded, that it was necessary to go on that day to Nunkhana, the second march on the Mooltan road. On the 24th and three following days, there were nine cases. On the 27th August, the disease ceased. Regarding the results of this movement, Dr. Webb, who was in Medical charge, writes as follows:—" At the time the men moved into camp, there were upwards of 25 men attending the Convalescent Ward established in barracks for diarrhœa. These cases rapidly decreased after the men had been under canvas for two or three days, and as this result was evidently referable to change of climate, and as the diarrhœa was a premonitory symptom of the Epidemic, I consider I am justified in concluding that the change was beneficial. The Battery encamped for the first time on the morning of the 23rd, and the change was not likely to have any effect on the disease in less than three or four days. After the expiration of this period, it had entirely disappeared; the last attack having taken place at about 6 A. M. of the 27th August."

On the evening of the 23rd August, 329 men of the 94th Regiment were moved into tents, pitched about 600 yards to the east of the barracks, within the Cantonment boundaries; 75 men remained behind for the protection of the buildings, and 70 were left in hospital. The sick from this camp were moved into the Regimental Hospital, and the duties of the orderlies in attendance on Cholera patients went on as usual. It was not to have been expected that an encampment of this kind would do much good, for the men were still exposed to nearly all the influences which appear to have aggravated the virulence of the Epidemic before they moved. But even this slight change was apparently beneficial. The average daily number of admissions for the four days preceding the move was 20, or about 4 per cent. on the whole strength; while, for the four days following, it was less than 14, or about 3 per cent.

On the 27th August, 214 men of the 94th were marched to Neaz Beg, an encamping ground on the road from Lahore to Mooltan, about seven miles distant from Meean Meer. In consequence of the heavy rain which had fallen, the direct road became impracticable, and the detachment was forced to make a detour, which added several miles to the length of the march. The men left Meean Meer at 6 P. M. on the 27th, and did not arrive at their tents until 1 A. M. on the 28th. They were thus greatly fatigued. They were able to bear little exertion, worn out as they were with depression and fear, and the harassing duties in the hospital. The delay that occurred upon the march seems to have been unavoidable, and nothing could exceed the care and foresight shown by Captain Norman in providing for the wants of the men. A number of doolies and Government Bullock Carts were sent with them, and nearly all the men were carried. Their beds were sent out with them, and an ample allowance of tents. The fatigue suffered by the men during this march was doubtless injurious to many of them. Nevertheless, the result of the change into camp was satisfactory in the highest degree. On the two first days after their arrival at Neaz Beg, 21 men were attacked with Cholera; but there can be no reasonable doubt that they took the seeds of the disease with them from Meean Meer. On the third day, the 30th August, there was only one case, and after this, with the exception of one more case on the 1st September, the disease disappeared altogether. Thus, on the fourth day after arrival in camp, the 94th shook off the Cholera. During the same period, in Cantonments, among about 126 men, there were 22 cases. The disease continued there up to the 15th September, and until the 10th September, there was no day in which cases did not occur. Altogether, from the 28th August to the end of the Epidemic, on the 15th September, there were 41 cases among 126 men. In the camp, between the 28th August and the 1st September, there were 24 cases among 214 men. It appears, however, highly probable that not a single fresh case really originated in the camp, and it would be difficult to find a stronger example of the advantage, during an Epidemic of Cholera, of abandoning the places that have become infected with the disease.

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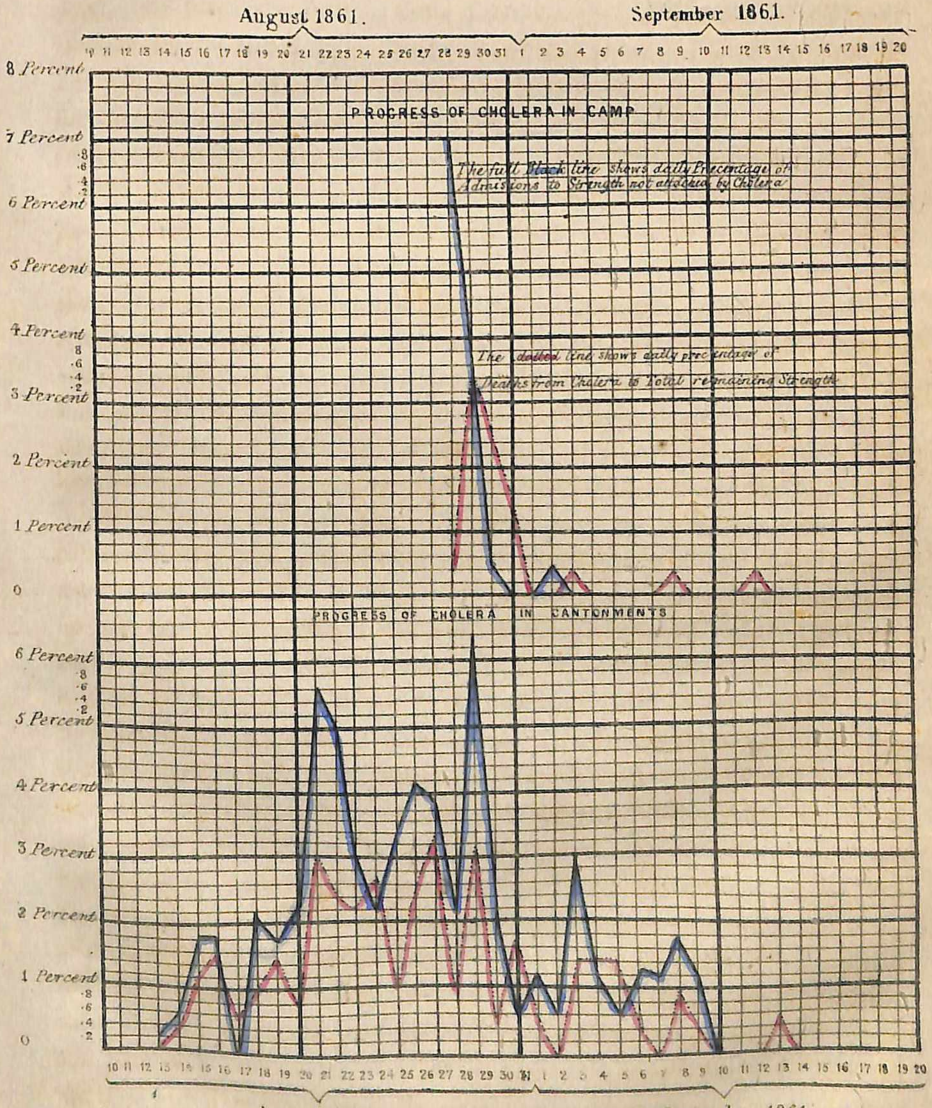
DIAGRAM

Showing the daily progress of Cholera in H. M. 94th Regt. (men only) in Cantonments of Meean Meer, and in Camp.



(Signed) A. B. Sampson.

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संस्कृति मंत्रालय · भारत सरकार

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The detachment of the 94th did not move from Neaz Beg, until it returned to Cantonments on the 25th September.

On the 25th August, the 5th Bengal Cavalry marched to Burkee, about seven miles to the east of Meean Meer, on the road to Hureekee. During the three first days after the move, there was no abatement of the disease, for there were in this time 11 cases, of which 8 were fatal. This was above the average of the previous week, but there were no fresh cases after the 28th August until the 3rd September. On this day there were two cases, both of them fatal, in the camp, and these were the last that occurred.

The march, on the 16th and 17th August, of five Companies of the 51st Regiment to Chubeel, ten miles from Meean Meer, on the Amritsur road, has already been noticed. This detachment was much less fortunate than the other troops who moved into camp, and its history is instructive. The detachment was 418 strong at Chubeel on the 17th August. The number of men left in Cantonments was 360, of whom 88 were in hospital, and 30 of the latter were Cholera patients. Thus, there were 330 men who had not been attacked by Cholera. On the 17th, 18th, and 19th August, the detachment halted at Chubeel. During this time there were 26 cases of Cholera, or 6·2 per cent. on the total strength. In Cantonments, during the same time, there were 32 cases, or 9·7 per cent. On the evening of the 19th August, the detachment was ordered to march to Ataree, seven miles distant, on the Amritsur road. Unfortunately, rain came on, and when the men reached Ataree, the whole of the encamping ground was under water. It was consequently thought necessary to push on to Ghurenda, five miles further. Two men died on the road, and the detachment reached Ghurenda on the morning of the 20th August, utterly exhausted. On the same day there were seven cases of Cholera; and on the following day there were twenty-two. The Civil Authorities at Umritsur considered it undesirable that a body of men suffering severely from Cholera should come so near to the station, on the main road from Lahore, along which constant communication was going on. In consequence of their urgent representations, it was determined to return to Chubeel, with the intention of marching from that place away from the main road. On the 23rd there were eight fresh cases in the camp; and on the same day the detachment marched back to Chubeel. The men were by this time completely prostrated and panic-stricken. Five men died on the march, and on the arrival of the detachment at Chubeel, the whole were so thoroughly knocked-up, that a few days' halt was absolutely necessary. On the 24th and three following days there were 32 fresh cases of Cholera. After the 29th August, the disease rapidly diminished, but it did not altogether

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disappear until the 7th September. Altogether in this detachment there were 135 cases, of which 68 were fatal.

Great as was the loss thus suffered, the men of the Regiment who remained in Cantonments suffered far more severely. From the 17th to the 27th August, out of an average strength of 360 men in Cantonments, 145 were attacked and 72 died. In the camp, during the same time, there were 102 admissions and 56 deaths, out of an average strength of 359 men. The percentage of admissions to strength in Cantonments was 43·1, and in camp 28·4. The percentage of deaths to strength in the former was 20·0, and in the latter 15·6. On the other hand—and this might, under the circumstances, have been expected,—the percentage of deaths to admissions, during the same period, was greater in the camp than in Cantonments. It was 54·9 in the former, and 49·7 in the latter.

There is some doubt regarding the number of men of the 51st who remained in Cantonments after the 28th August, and the comparison cannot be carried further, but after this date the virulence of the disease diminished both in Cantonments and in camp. The disease finally left the camp on the 7th September, but lingered among the men of the Regiment in Cantonments until the 15th September.

While the history of this detachment shows clearly the importance of sending Troops into camp during the prevalence of Cholera, it strongly supports the opinion that when Troops are marched at such a time, they must be handled with the greatest caution, and exposed to as little fatigue or other depressing influences as possible.

On the 27th August, a camp was formed at Umur Siddhoo, four miles from Cantonments, on the Ferozepore road. Eighty men of the 51st were sent there on that and the following day from Meean Meer. There were only three cases of Cholera after their arrival at the camp, and the disease soon left them. After this, few Europeans were left at Meean Meer, except the sick in the hospital.

This somewhat minute account of all these movements into camp has been given because their results are very important. They were undertaken at the worst season of the year, under the most difficult circumstances, yet their success was remarkable and uniform. The exposure under canvas produced no other bad effect upon the health of the men. It is true that there was a large amount of fever in September, but this was not peculiar to the Troops. A season was hardly remembered at Lahore in which fever had been so prevalent among all classes of the population.

In the 51st Regiment, among the Officers, there was one fatal case; one Medical Officer was attacked and recovered. The only other case of undoubted Cholera among Officers at Meean Meer was that of a Medical Officer with the 5th Cavalry. He recovered.

It will be seen from the Returns that the women and children suffered very severely. Their position was peculiarly painful. The women were all, more or less, suffering from illness or depression of spirits, and they complained bitterly that they could procure none of the things that they required unless they went into hospital. When, however, this became known, the residents of Anarkullee and the Officers at Meean Meer showed them great kindness. Money was contributed to purchase for them the comforts that they wanted; mourning was provided for the widows and children, and arrangements were made for the maintenance and education of orphans.

Female Nurses were much required for the Women's Hospital, and in their absence women attacked by Cholera were attended by men. The Deputy Commissioner, Mr. Egerton, procured at Anarkullee six native women for this duty, and they were sent over to Meean Meer. But no proper arrangements were made for their reception or accommodation, and they all ran away almost immediately after their arrival.

FORT LAHORE.

When the Epidemic commenced at Meean Meer, the Fort of Lahore, the position of which has been already described, was occupied by 183 men of the 51st Regiment, and 54 men of the 3rd Company, 4th Battalion Bengal Artillery. With the latter were 13 women and 17 children.

The Troops in the Fort are partly accommodated in the buildings of the old Palace of Runjeet Singh and his Mohammedan predecessors, and partly in barracks built by our own Government. Nearly all these buildings are about the same level as the highest part of the Citadel, about 50 feet above the valley of the Ravee close below. The accommodation for the men was, upon the whole, good and sufficient, although there are many points in which it might have been better.

The drainage of the Fort itself is good, but water collects immediately below the walls in the low ground to the north.

Cholera did not appear in the Fort for nearly three weeks after its commencement in Meean Meer. The first case was that of a Native Trooper of the 15th Cavalry, who was on guard at the rum godown. The case occurred on the 19th August, and proved fatal. No connection was traced between it and any other cases either before or afterwards. On the 21st August two men of the 8th Company, 51st Regiment, occupying the small Infantry Barrack, were attacked with Cholera. About thirty yards from the south-east corner of this barrack there is an objectionable latrine built for the use of Natives. The Medical Officer reports that the men complained of the offensive smell, and that the prevailing wind carried the effluvia towards the barrack. The first case of Cholera occurred in a small room at the corner of the barrack nearest to the latrine. On the same day a case also occurred in the 4th Company, 51st Regiment, occupying the Dewanee Am Barrack, a fine lofty building, once the audience hall of former Sovereigns, standing 133 yards to the east of the small barrack.

In the six following days there were 18 more cases. Altogether, there were 21 cases, and 16 deaths up to the 27th August. Ten cases occurred in the Dewanee Am Barrack, being at the rate of 7·7 per cent. to strength, and eleven cases in the small barrack, being at the rate of 22 per cent.

The conservancy arrangements in the Fort were carried out on the ordinary system. The latrines and urinaries were, as usual, very unsatisfactory.

Early on the 27th August, a detachment of the 51st Regiment, 100 strong, was sent from the Fort to some old native buildings formerly occupied by Sikh Artillery, called Lena Singh's Chaonee, two or three miles distant. This place had the reputation of being particularly healthy. The Civil authorities undertook to make all the necessary arrangements. The old gun-sheds were cleaned out, and the tents of the Civil Officers were pitched for the men. Nothing could exceed the kindness shown by the European residents of Anarkullee. They sent everything which they thought could in any way contribute to the comfort of the Soldiers, and the men were much better off in every respect than if they had been in their own tents. The buildings were occupied during the heat of the day, and the men slept in the tents at night. Immediately after the arrival of the detachment, two men were attacked with Cholera. In the evening there were two more cases; on the 28th there were two cases, and on the 29th seven cases. As the disease continued to be virulent, the detachment marched on the 30th August, about a mile and a half, to a house belonging to Mr. Kirke, Assistant Secretary to the Government of the Punjab. This gentleman liberally and considerately placed his house and grounds at the disposal of the Military authorities. The house, an excellent double-storied building, was occupied as a hospital, and the tents were pitched close by. The water is said to have been very bad, and hardly drinkable. On the night of the 30th there were three fresh cases of Cholera, and on the 31st there were four more. It was therefore thought desirable again to move. The sick were sent to the Meean Meer hospital, and twenty men accompanied them as orderlies. The rest of the men were taken on the night of the 31st August in Bullock Train carts to the camp at Umur Siddhoo, and the disease, after this time, very soon disappeared.

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Altogether, in this detachment, there were 21 cases and 13 deaths in the five days after leaving the Fort. The men spoke gratefully of the kindness of Dr. Fagan and Dr. Schmitz, who accompanied them.

Among the men of the 51st who had remained in the Fort, about 60 in number, there appear to have been no fatal cases after the 27th August.

The removal of this detachment was apparently less successful than usual in its results. It is difficult, however, to speak decidedly upon the subject. Although the men who remained in the Fort suffered much less than the men who marched to Lena Singh's Chaonee, it must be remembered that when the detachment left the Fort, Cholera was very virulent, and it seems reasonable to suppose that in many cases they took with them the seeds of the disease. This is rendered the more probable by the fact reported by the Medical Officers, that every one of the 21 men attacked with Cholera on the march, had been previously suffering for several days from diarrhœa.

A somewhat remarkable story has to be told to complete the account of this detachment. There was at Lahore a gang of notorious bad characters, condemned to labour on the roads, and kept under surveillance, although not confined in the Common Jail. These men, about 80 in number, were sent to Lena Singh's Chaonee to assist in pitching tents and digging trenches, and for the performance, generally, of services for the detachment of the 51st Regiment. The whole gang was twice employed, once on the 27th August, and again on the 30th. Twenty men remained day and night with the detachment. They were employed in every kind of attendance upon the sick. After the men of the 51st left Mr. Kirke's house on the 31st August, the gang returned to their own quarters. Up to the 4th September there had been no cases of Cholera among them, nor did the disease at any time show itself among the Native population of the neighbourhood. On the 4th September Cholera broke out among the gang. Ten men were attacked and three died. These men had only been employed in pitching tents and other general duties, and were not among those who had actually attended on the sick. Considering how complete was the immunity of all other classes of Natives, it can hardly be doubted that the outbreak of Cholera among these men was caused by their exposure in a locality infected by the presence of the European Soldiers. The case is also interesting in another point of view. It seems to show how the poison of Cholera may remain undeveloped in the system for three or four days after exposure to the cause of the disease.*

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* There are many discrepancies, which cannot be reconciled, in the Returns for the Fort of Lahore, and the correctness of all the figures given above cannot be guaranteed.

Among the men of the Artillery in the Fort, 54 in number, there were only two cases, one on the 28th and one on the 31st August. One of these proved fatal. The women and children escaped altogether. Dr. Watson, who was in Medical charge, exerted himself to the utmost. He has given his opinion, in the following words, regarding the escape of the Artillery from Cholera :—" I attribute this remarkable immunity from the disease to the more cleanly habits of the men, to their having a better system of messing, to the fact of their being more seasoned men, and more accustomed to the Indian climate and mode of life. Seven of them are country-born, and no less than twelve are married men. They were not allowed any additional grog, but were supplied with excellent beer from the Canteen. They were also less crowded in the barracks, and the building occupied by them is, upon the whole, the best in the Fort. The men are, as a body, a better educated class of men, and display a more lively appreciation of the advantages connected with personal comfort and cleanliness."

Two Officers of the 51st Regiment were attacked with Cholera in the Fort, but both recovered. The Officers' quarters are small, and the ventilation of the buildings is insufficient.

The Report of the Commission regarding the Epidemic of Cholera at Meean Meer and Lahore concludes as follows :—

" We wish to express our opinion of the admirable services rendered by Major Young, Deputy Judge Advocate General, and by Captain Norman, Deputy Assistant Quarter Master General of the Division. The arrangements made by Captain Norman for facilitating in every way the marches of the men, for sparing them fatigue, and affording them every possible comfort, deserve the highest praise. We feel that the account which we have given will remain most imperfect if we omit prominently to notice the zeal and devotion which he showed. In visiting the hospitals and the camps, and in the untiring and unflinching discharge of every duty, Major Young and Captain Norman afforded a noble example to every one. We desire also to speak with the highest respect of the Chaplain, the Reverend H. Murray, and of the Roman Catholic Clergymen at Meean Meer and Anarkullee. Nor must we forget to mention the labours of one long known as foremost in every good work, the Reverend C. Sloggett, Chaplain of Lahore. Mr. Egerton, the Deputy Commissioner, and the Civil Authorities generally, exerted themselves to the utmost to give every help that was in their power. We have already noticed the excellent services of Dr. Harper, in Medical charge of the Bengal Artillery. We have spoken in severe terms of many of the arrangements in the Infantry Hospitals. Lamentable, however, as were many of the results, we desire to repeat that nothing could exceed the personal devotion to their duty which was shown by the Medical Officers at Meean Meer."

AMRITSUR.

The city and station of Amritsur are about 32 miles distant from Lahore. They lie to the east of Lahore, and are situated on the main road from Umballa and Delhi. While the Cholera was at its height at Meean Meer, there were no cases among the Troops at Amritsur; and although the disease had shown itself slightly in the city, it was hoped that the station would escape. But on the 2nd September Cholera broke out.

The Table over-leaf shows the strength of the Troops at Amritsur at this time, with the number of cases of Cholera that occurred among them.

REGIMENT.	STRENGTH.			CASES OF CHOLERA.						PERCENTAGE.								
				Men.		Women.		Children.		Cases to Strength.			Deaths to Strength.			Deaths to Cases.		
	Men.	Women.	Children.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Men.	Women.	Children.	Men.	Women.	Children.	Men.	Women.	Children.
H. M.'s 94th Regt., Left Wing	434	15	9	47	38	1	1	...	...	10·8	6·7	...	8·8	6·7	...	80·9	100·0	...
Bengal Artillery Division	107	14	18	4	3	1	1	...	...	3·7	7·1	...	2·8	7·1	...	75·0	100·0	...
Total ...	541	29	27	51	41	2	2	...	...	9·4	6·9	...	7·6	6·9	...	80·4	100·0	...

The following Table shows the same particulars for the Native Troops :—

REGIMENT.	STRENGTH.			CASES OF CHOLERA.						PERCENTAGE.								
				Men.		Women.		Children.		Cases to Strength.			Deaths to Strength.			Deaths to Cases.		
	Men.	Women.	Children.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Men.	Women.	Children.	Men.	Women.	Children.	Men.	Women.	Children.
19th Regiment Native Infantry (Goorkha) Detachment	213	50	44	13	11	8	6	5	4	6·1	16·0	11·4	5·2	12·0	9·1	84·6	75·0	80·0
Total ...	213	50	44	13	11	8	6	5	4	6·1	16·0	11·4	5·2	12·0	9·1	84·6	75·0	80·0

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The city of Amritsur contains 122,000 inhabitants, of whom about half are Hindoo and half Mohammedan. It lies in a basin of some 20 square miles. The drainage of the city and the adjacent country runs into the ditch which surrounds the city wall. The ditch has no outlet, and consequently in many parts is very filthy. Close to the city, on the north-west, stands the Fortress of Govindgurh, once the great stronghold of the Sikh power, and now occupied by us. The Cantonments of Amritsur are about two miles from the city to the north-west. The station has been considered generally healthy. The barracks are, upon the whole, good, and the men were not crowded. The conservancy in Cantonments is upon the ordinary plan, but in the Fort the condition of some of the latrines was offensive in the extreme. The state of the ditch round the Fort is objectionable, and measures should be taken for draining it. It is deeper than the city ditch, and there are no means of getting rid of the water which must accumulate in it during the rainy season. Two Companies of the 94th Regiment and a Company of Artillery occupied the Fort, while three Companies of the 94th and one of Artillery were stationed in the Cantonments.

The Infantry Hospital in Cantonments was designed to hold 32 patients, but on the 2nd September, when Cholera first appeared, it contained 47, and during the preceding eleven days the proper number had always been exceeded. On the 2nd September the available space for each patient inside the building was only about 655 cubic feet, and 33 superficial feet. The actual space allowed was, however, larger than this, because some of the patients were placed in the verandahs. For about a fortnight before the outbreak of Cholera, intermittent fever and diarrhœa had become very prevalent. Until that time the men had been generally healthy.

The first man attacked with Cholera was a patient in hospital, and a very large proportion of the men subsequently admitted, writes Dr. McGrath, who was in Medical charge, "were either in hospital at the time under treatment for other diseases, or had been recently discharged therefrom." On the 3rd September another case occurred in the hospital. On the 4th and 5th there were no cases, but on the 6th there were seven fresh admissions, of which four were from the Fort, and one was a patient in hospital. On the 6th September all patients suffering from other diseases were moved into an empty barrack, and the hospital was reserved for Cholera cases.

On the 7th September three Companies, 192 strong, marched from Cantonments to a camp formed about six miles distant, on the Hooshyarpoor Road. Through some mistake one of the Companies lost the road, and was exposed to much fatigue in consequence. One man died on the

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way; but after arrival in camp there were no other cases, and the disease disappeared from the detachment.

Between the 7th and the 12th September, there were 27 cases in Cantonments and 19 deaths. Most of these were patients in hospital. The strength of the men left in Cantonments on the 7th September was about 220. Although the overcrowding had ceased after the removal of the hospital on the 6th September, Cholera still continued to attack the patients. Every care appears to have been taken to keep the buildings in good order, but the disease could not be shaken off. On the 12th September, No. 8 Company, which had suffered very severely, was sent into camp on the Ferozpoor road, about seven miles. During this and the three following days, eight cases of Cholera occurred in the detachment, which was 79 strong. The ground upon which the camp was pitched was considered unhealthy, and on the 16th the men marched to better ground, three miles further on. After this there were no more cases. In seven out of eight instances, the men attacked with Cholera in this detachment were patients in hospital with intermittent fever; and the eighth case was that of a man who had been on guard all night. On the 13th September no cases occurred in Cantonments, but on the 14th a patient in hospital was attacked. On the 15th the remaining Company, strength 64 men, was sent into camp, on the Hooshyarpoor road. In the three following days there were two cases in this detachment, one of them a hospital orderly, and the disease then disappeared. After the departure of this detachment, the sick in hospital and the married people alone remained in Cantonments. On the 18th and 19th September three men were attacked in Cantonments, who were employed on hospital duty. On the 19th, the sick in hospital, with the exception of the Cholera cases, were taken into camp, and the married men and their families went at the same time. After this no other cases occurred, with the exception of a woman, who was attacked and died in camp on the 29th September.

Altogether there were 47 cases among the men of the 94th Regiment, of which 38 were fatal. Five of these were in the Fortress of Govindgurh. Out of the whole number of cases, 23 occurred among patients in hospital with other diseases. The average healthy strength was 385; the average number of hospital patients was 41. Among the former there were 24 cases of Cholera and 16 deaths; among the latter there were 23 cases and 22 deaths. The percentages of cases to strength, deaths to strength, and deaths to cases, among the healthy strength of the Regiment, were 6·2, 4·2, and 66·7; while among the hospital patients they were respectively 56·1, 53·7, and 95·7. The following were the diseases from which the patients were suffering when they were attacked by Cholera:—Fever 15; Ophthalmia 2; Diarrhœa 3; Debility 1; Syphilis 1; Hœmorrhoids 1. With the exception of one man with Fever, all these patients died.

Hospital orderlies were furnished in the usual manner, but the number on duty at the same time was never large, and they were generally relieved every six hours. There were five cases of Cholera among them.

Among the men of the Artillery there were four cases of Cholera, of which three were fatal. The two first cases occurred in the Fort on the 11th September. On the following day there was a case in Cantonments. On the 14th the men were marched into camp, about five miles on the Julundhur road. Immediately after their arrival at the encamping-ground a man was seized with Cholera, but this was the last case among them.

The accommodation for the Artillery, both in Cantonments and in the Fort, was ample.

No Officers or other European residents at Amritsur were attacked by Cholera.

In the city of Amritsur only 58 deaths are said to have occurred. There had been a few cases before the disease appeared in the Cantonments; in the surrounding country there was little or no Cholera; and the escape of the Native population generally was as strongly marked as it had been at Lahore. There were no cases in the Amritsur Jail, which contained nearly 700 prisoners.

In the detachment of the Goorkha Native Regiment at Amritsur, there was, however, a severe outbreak of the disease, and the circumstances under which it occurred deserve to be noticed. The first man attacked was a patient in hospital, on the 6th September. On the same night two men and a woman, living in different parts of the lines, were attacked. On the following morning the men were consequently ordered into camp, to a distance of about three quarters of a mile from the lines. The hospital remained in Cantonments. There were some cases among the women and children, but none among the men after they moved into tents. But between the 8th and 12th September there were nine cases in Cantonments. Four of these were men who had been left on guard; three were patients in hospital with other diseases, and two were on duty in the hospital. On the 12th September the detachment marched seven miles further, and the sick in hospital accompanied them, with the exception of a few cases which could not be moved. There was only one case in camp among the hospital patients, but several women and childern were attacked. The last case occurred on the 16th September. On the 15th, when hardly any one belonging to the

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Regiment remained in Cantonments, a man who was attending upon a female Cholera patient was attacked, and on the same day a case was admitted from the Fort. This was the last case that occurred.

Altogether, out of thirteen cases in this Regiment, five occurred among patients in hospital with other diseases, and three among men employed on hospital duty.

Native Troops are seldom so well housed as at Amritsur. They live in barracks with thatched roofs, and tolerably ventilated. The condition of the hospital was, when the Cholera appeared, very far from satisfactory. Twenty-one patients were crowded together in two rooms, each about 19 feet long by 9 feet broad and 9 feet high. Thus each patient had less than 150 cubic feet of space. It was not wonderful that Cholera should be virulent among those who had to live in an atmosphere so pestilential.

The circumstances which attended the progress of the Epidemic at Amritsur are altogether of considerable interest. They show very distinctly the necessity of abandoning the places that have become infected with the disease; the bad results of delay in doing so; and, above all, the destructive effects produced by a faulty system of hospital management.

FEROZPOOR.

With the exception of a few mild cases of a doubtful character, which require no special notice, there was no Cholera among the European Troops at Ferozpoor; but the 19th Goorkha Regiment suffered severely.

Ferozpoor is situated on the left bank of the Sutlej, about 50 miles from Lahore. The Cantonments lie two miles to the south of the town. The surrounding country is bare and arid. The wells are numerous; water is abundant, and it is considered wholesome. The drainage is, upon the whole, good, and measures are in progress for its further improvement.

The station has been generally healthy, but it has not been exempt from severe visitations of Cholera. The European Troops at Ferozpoor suffered greatly from Cholera during the Epidemic of 1856. The Infantry Barracks are spacious and well ventilated. Those provided for the Artillery are old buildings, badly planned and badly ventilated, and the ground on which they stand is low.

The Head Quarters and seven Companies of the 19th Goorkha Regiment, 441 strong, were quartered in the Native Infantry lines. This is the Regiment of which a detachment was stationed at Amritsur, the outbreak of Cholera in which has been already noticed. The men lived in lines of mud buildings arranged in a series of parallel rows, separated by streets 18 feet broad. Each row is divided into a number of small huts, each of which is intended for two persons; most of the men were married, and lived in the huts with their wives. The huts are about six feet high; the floors are all considerably below the surface of the ground outside, often as much as three or four feet, so that it is necessary to descend into them by steps. Each hut is sub-divided in two or more compartments; light and air are only admitted by the door in front, and, in the inner compartment, there is a small aperture in the outer wall. Thus there is almost no ventilation. Behind each hut there is a necessary for the women. The wall of the hut forms one side of this, and on the other side there is a screen wall of mud. These places are supposed to be cleaned out twice every day by the sweepers. No latrines are provided for the use of the men. The ground being so low, and there being no proper drainage, water, in the rains, often runs into the huts, and they thus remain for a long time in a damp and uncomfortable state. During the season of the hot winds, on the other hand, the huts are said to be almost unbearable from heat. When occupied, as they were during this Epidemic, by men who were Natives of the Hills, more or less unaccustomed to exposure to the climate of the plains, their extremely bad sanitary state was likely to produce the worst effects upon the health of their inmates.

Cholera appeared in the town of Ferozpoor on the 3rd September. The three persons first attacked are said to have arrived on that day from Lahore. After this a few cases occurred daily; but the disease never became virulent. Altogether 40 persons, chiefly belonging to the poorer classes, are said to have been attacked, and of these about one-third died.

On the 9th September, the disease broke out in the Goorkha lines. Between this date and the 23rd September, there were altogether in this Regiment 53 cases and 34 deaths.

Sixty men had died of small-pox during the previous eighteen months. The real Goorkhas, belonging to a strong and sturdy race, who eat meat frequently, drink spirits, and have comparatively few prejudices of caste, are said to have been the principal sufferers from small-pox; but, on the other hand, they were attacked by Cholera in a smaller proportion than the men belonging to the other Hill tribes, Kumaonees, Gurhwalees, and Doteals, who are generally of more abstemious habit. Thus the class of men whose constitution and habits approached the nearest to those of the European Soldiers did not prove especially liable to the attack of Cholera. In common, however, with the other Hill-men of the Regiment, the Goorkhas, both at Ferozpoor and Amritsur, were

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apparently, like the Europeans, more subject to the influence of the Epidemic than the Native population generally.

Those parts of the Cantonment which suffered least were those of which the sanitary condition was the best, and it was only in that part of the station where that condition was excessively bad that Cholera seemed to find all that was necessary for its development in an aggravated form. Yet we may find evidence in the past history of this very station, that the diffusion of the disease is not dependent on such circumstances alone. In 1856, in Her Majesty's 70th Regiment, there were 89 fatal cases of Cholera among 776 men. The present Infantry Barracks did not then exist, and the accommodation was very inferior. The Artillery in 1856 lost 43 men, out of a total strength of 146. They were quartered in the badly constructed barracks which the Artillery still occupy. The 57th Regiment N. I., and the Native population in the Sudder and Regimental Bazars, suffered at the same time, but not severely. The 45th Regiment N. I. lived in the same lines which, during the late Epidemic, were occupied by the Goorkha Regiment, and the complaints regarding their sanitary state seem to have been as great then as they are now. Yet this was almost the only part of the Cantonment which escaped the attack of the Epidemic in 1856.

JULUNDHUR. UMBALLA.

It has been already stated that the Epidemic did not extend to the Military stations north of Lahore and Amritsur, nor did it attack the Native population in that portion of the Punjab. The country lying between the Beas and the Sutlej, called the Julundhur Doab, enjoyed generally the same immunity. This tract presents a remarkable contrast to the arid plains which constitute a large portion of the Punjab and of the Cis-Sutlej States. Almost everywhere the country is green and pleasant, magnificently fertile, adorned with groves of mango trees, and filled with a thriving population. The Military station of Julundhur, situated about three miles to the east of the town of the same name, has the reputation of being one of the healthiest in India.

Although it has not been altogether exempt from the attacks of past Epidemics of Cholera, it has, upon the whole, like the surrounding country, been comparatively free from the disease. The water is abundant and of excellent quality; the soil is sandy and absorbent. The station is well wooded, and covered with gardens and rich vegetation, and a better example could hardly be found of the fallacy of the very common Indian notion, that almost every tree and shrub is to be looked upon, under all circumstances, as a source of malaria and disease. Native opinion ascribes the healthiness of the place to its distance from all rivers and the alluvial lands upon their banks. A Regiment of European Infantry and a small force of Artillery are usually stationed here. The barracks and other buildings provided for the European Troops are, with the exception of the Infantry Hospital, which is a new and convenient building, generally old and of indifferent construction. The latrines are exceedingly bad, and there is nothing in the conservancy arrangements which can explain the healthiness of the station. The advantages which the Troops at Julundhur enjoy, appear to arise solely from the operation of natural causes. In 1861 there was no Cholera in the station, or in the surrounding country.

The district of Loodiana, which lies immediately to the south of the Sutlej, and due east from Ferozpoor, appears also to have entirely escaped the attack of Cholera. It prevailed, however, epidemically in Umballa, the district adjoining Loodiana on the south; and so far as the Native population was concerned, this may be considered to be the northern limit of the tract in which the late Epidemic assumed a virulent form.

The Military station of Umballa lies four miles from the town of the same name, on the Grand Trunk Road, about 120 miles north of Delhi, and about 30 miles from the foot of the mountains in which are situated the stations of Kussowlee, Dugshai, Subathoo, and Simla. Umballa was occupied by European Troops after Kurnal had been abandoned as a Military station on account of its extreme unhealthiness.

The Cantonment extends about three miles from north-east to south-west. At the north-eastern extremity of the station are the lines of the Native Cavalry and of the European Artillery. On the left of the Artillery lines are situated those of the European Cavalry; those of the European Infantry come next; and the Native Infantry lines occupy the south-west end of the Cantonment. The whole station is traversed from end to end by parallel roads, crossed by others at right angles, an arrangement very favorable to the free circulation of air, and therefore to health. The highest part of the Cantonment is that at the north-east extremity, and the ground slopes gradually to the south-west, so that the Native Infantry lines occupy the lowest part of the station, while the lines of the European Infantry are the lowest of that part of the Cantonment occupied by the European Troops.

The drainage of the northern end of the Cantonment is good; but in the Infantry lines the slope of the ground being very little, the drainage is imperfect. "The ground," writes Dr. Brown, Deputy Inspector General of Hospitals, "is flat, and for a short time after a heavy fall of rain, the men could hardly go dry shod from one building to another."

The soil in the lines of the Native Cavalry and of the Artillery is sandy, but in the European Cavalry and Infantry lines it is clayey. The

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lines of the European Cavalry and Infantry are almost devoid of trees, while those of the Artillery and Native Cavalry are comparatively well wooded. Altogether, there is a very obvious difference in the appearance and physical character of the two extremities of the Cantonment. This distinction is further seen in the difference of the water supply. In the Native Cavalry lines the water is always good, and comparatively plentiful. In the Artillery lines the supply, although less ample, is still generally sufficient. The depth of the wells varies from about 30 to 45 feet. In the European Cavalry and Infantry lines the supply of water appears to have been, of late years, becoming more and more deficient. In the former the wells are generally all dry early in the hot season; in the latter there were only a few inches of water in the wells in November 1861. Possibly this deficiency of water may, in some measure, be due to the arrangements connected with the drainage of the station, and particularly to the embankments, which have been constructed to prevent the water of the Tangra stream from entering the Cantonments.

A masonry channel has been constructed, which brings water along the whole front of the Cavalry and Infantry lines, from wells sunk in the bed of the stream, on the extreme right of the Cantonments. This measure has, however, been insufficient. Not only is the quantity of water supply to the Infantry lines, in particular, very deficient, but its quality appears open to much suspicion. This question of the supply of water to the Troops at Umballa is one of much importance.

According to the information received by the Commission, and the authenticity of which there is apparently no reason to doubt, the Native Cavalry lines have never been attacked by Cholera in any Epidemic that has visited the station. The Artillery lines, although not altogether exempt, have generally suffered little. The Cavalry lines have been more subject to attack, and the disease has invariably assumed its greatest virulence in the lines of the Infantry.

Umballa has generally been a healthy station, but it has been visited severely by several Epidemics of Cholera.

The barracks are extended in echellon, in a continued line, upwards of two miles in length from north-east to south-west, each barrack facing east and west, having an ablution house with urinary attached, closely adjoining the south-east corner of each barrack.

An interval of 433 yards separates the lines of the Artillery, Cavalry, and Infantry. They thus form three distinct blocks, and in each of these the barracks are 76 yards apart. The Artillery and Cavalry Hospitals are placed opposite to the intervals between the adjacent lines; the Artillery Hospital 1,000 yards, and the Cavalry Hospital 750 yards, on the east front of the line of barracks. The Infantry Hospital is the nearest to the barracks, covering the four last barracks of its own lines, at a distance of 500 yards in their east front.

The barracks are all built upon the same general plan. Each of the principal buildings is intended to hold one Company. They consist ordinarily of three large centre rooms, each 57 feet long, 24 feet broad, and 24 feet high. These rooms open on each side into enclosed verandahs, 12 feet broad and 20 feet high, and outside again there is an open verandah which runs all round the building. There are small rooms for Sergeants at both ends. The roofs are thatched; sufficient ventilation is generally provided. When the barracks are occupied by the number of men for which they were designed, each man has an allowance of about 1,700 cubic feet of space, and about 68 superficial feet. On the outbreak of the late Epidemic, the men had generally at least this allowance, and the barracks were never crowded.

The hospitals are well ventilated and commodious buildings, raised, like all the barracks at this station, between two and three feet from the ground. They face north-west and south-east. The Artillery and Cavalry Hospitals are each intended for 68 patients. The Infantry Hospital consists of two wings, affording accommodation and ample space for 62 patients in each, or 124 in both wings.

The accommodation provided for the married people and children is insufficient and inconvenient. This is the case throughout the European lines.

The latrines extend in a line along the whole east front, at a distance of 150 yards from the barracks and between them and the hospitals. They are built according to the usual surface system. Their construction is such that it is impossible to keep them clean, and their condition, when the Commission visited Umballa, was very offensive. Their position in a long line to the east of the barracks makes them the more objectionable, since they are directly to windward in the rainy season, which is commonly the most unhealthy part of the year, and that in which Epidemics of Cholera generally occur.

The latrines attached to the hospitals are similarly constructed. They are connected with the main buildings by covered ways. They are placed at the east and south-east corners of the hospitals; and, from their close proximity, they are still more objectionable than the latrines belonging to the barracks.

The urinaries are built close to the south-east corner of each barrack. Both in their position and in their construction they are open to great objection, and their condition was very offensive.

The ordinary system of conservancy is in force, and need not be more particularly noticed here.

The first case of Cholera reported at Umballa occurred in the Sudder Bazar on the 10th or 11th of July. The person attacked was a woman who had just arrived from Delhi, where the disease was then present. On the 17th July, Cholera broke out in the Poor-house established in Cantonments for the relief of sufferers from the famine, which at this time prevailed. The Poor-house was situated close to the Sudder Bazar; it consisted of a large Court-yard, surrounded on all sides by thatched sheds. Due care seems to have been taken to preserve the buildings in a proper state of cleanliness; but this was a task of considerable difficulty, and the sanitary condition of the ground in the neighbourhood of the Bazar was far from satisfactory. The inmates of the Poor-house, nearly 500 in number, were all infirm and miserable objects, belonging, almost always, to the lowest classes of the population, and extremely filthy in their persons and clothing. On the 19th July, and on the two following days, 6 cases of Cholera occurred. It was then wisely determined to break up the Poor-house, and on the 20th July most of the paupers were sent to their homes with a gratuity. Eighty-two persons remained, who were too infirm or too ill to be removed, and among them, during the following seven days, there were 13 cases of Cholera, all of which proved fatal. After the 27th July there were no more cases.

During the last 10 days the disease was common, though not very virulent, in the Sudder Bazar. On the 31st July, it appeared in the city of Umballa. The disease seems to have reached its climax among the Native population towards the end of August, and it ceased about the middle of September. The total number of deaths in the town of Umballa, which contains a population of about 22,000 persons, is stated to have been from two to three hundred. But regarding the actual mortality that occurred, very little is known.

On the 7th September Cholera made its appearance in the Jail, which lies about three miles to the north of Cantonments, and one mile south of the town. The first man attacked was one of the guard who had been on duty in the city. On the 9th September there were three cases among the prisoners. The disease continued until the 23rd September, when it ceased; during this time there were altogether 27 cases and 18 deaths. The number of prisoners was about 800. The Jail is badly situated, and the buildings were crowded and ill constructed.

Regarding the Epidemic in other parts of the Umballa District very little authentic information could be obtained. The eastern parts of the District about Jugadree principally suffered; but the disease was no where very fatal. It was commonly believed at Umballa that the Cholera had travelled up from Kurnal, which lies on the Grand Trunk Road, fifty-five miles to the south, but of this no evidence worth notice could be discovered.

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The following Table shows the strength of the European Troops at Umballa when the Epidemic appeared, and the number of cases of Cholera that occurred :—

REGIMENT.	STRENGTH.			CASES OF CHOLERA.						PERCENTAGE.								
				Men.		Women.		Children.		Cases to Strength.			Deaths to Strength.			Deaths to Cases.		
	Men.	Women.	Children.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Men.	Women.	Children.	Men.	Women.	Children.	Men.	Women.	Children.
H. M.'s 89th Regiment...	879	39	57	61	45	3	2	9	8	6·9	7·7	15·8	5·1	5·1	14·0	73·8	66·6	88·8
H. M.'s 7th Hussars	654	27	28	10	7	...	...	1	1	1·5	......	3·6	1·1	......	3·6	70·0	......	100·0
Bengal Horse Artillery...	237	26	39	...	...	...	...	...	...	......	......	......	......	......	......	......	......	......
Total	1770	92	124	71	52	3	2	10	9	4·0	3·3	8·1	2·9	2·2	7·3	73·2	66·6	0·0

The following Table gives similar particulars for the men of the Native Regiments :—

REGIMENT.	Strength.	CASES OF CHOLERA.		PERCENTAGE.		
		Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases
4th Regiment Bengal Cavalry	311	....	....	.. ..	....	....
24th Regiment Native Infantry	409	4	2	1·0	0·5	50·0
Total	720	4	2	0·6	0·3	50·0

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The first case of Cholera among the European Troops occurred on the 29th July, in Her Majesty's 89th Regiment.

The Regiment arrived at Bombay in the cold season of 1857-58. The men were much exposed during the following two years. They were often employed on field service; they were forced frequently to march at the hottest season of the year, and there were generally no proper means of housing them. In the cold season of 1860-61 the Regiment was sent to Umballa, where it arrived on the 1st March 1861. The men rapidly improved in health at Umballa, but still, as might have been expected from their past exposure, they were very susceptible to fever, and the number of admissions into hospital on this account was large during the hot months preceding the outbreak of Cholera.

The duties of the men at this time were not at all severe; there was little night duty; there was no needless exposure to the sun; nor were there any apparent causes connected with the habits of the men which were likely to make them especially liable to the attack of Cholera.

The first case of Cholera occurred on the 29th July, in the hospital of the 89th Regiment, in a patient suffering from dysentery. On the same day, a man in barracks, who had been discharged from hospital on the preceding day, was also attacked. Both these cases were fatal. On the following day, there were five more cases of Cholera among the patients in hospital with other diseases. On the 31st there was another case in barracks, and on the 1st August, a patient in hospital with dysentery was attacked. On the 2nd and 3rd August there were no cases; but on the 4th and three following days, there were eighteen cases in barracks, and five cases among the patients in hospital.

On the 5th August, Dr. Brown, Deputy Inspector General of Hospitals, made a strong recommendation to the General in Command, Sir Robert Garrett, that the Regiment should be moved into camp. The General immediately gave the necessary orders, but there was some delay in obtaining carriage, and it was not until the 8th August that the Regiment was able to move. On that day about 600 men marched to Lalroo, a place about 13 miles distant, not far from the road leading towards the hills. It was not considered at the time a very good place for an encampment, but no information could be obtained to help the Authorities in their choice, and the country was, to a great extent, under water.

Including the sick in hospital, about 200 men remained in Cantonments, and the women and children.

Up to this time there had been altogether in the Regiment 32 cases of Cholera, of which 12 had occurred among the patients in hospital

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with other diseases; one of the others was that of a man just discharged from hospital, and three of them were among the hospital orderlies.

The Regiment remained at Lalroo until the 14th August. During the six days following the march there were nine cases of Cholera among the men in camp, and five among those in Cantonments. The percentage of attacks to strength was, in the former case, 1·5, and in the latter case 2·5. In the four days preceding the movement, the cases in Cantonments had been 3 per cent. on the whole strength. Thus the change was apparently very beneficial.

Although the number of cases in camp was not great, the disease did not altogether cease, and, on the 14th August, the tents were shifted to better ground at Dubur, a place about a mile nearer to the Cantonment. On the 14th and two following days there were altogether four cases in camp, and two in Cantonments. The disease then ceased among the men in both places until the 23rd August. During this time there were, however, several cases among the women and children in Cantonments, and between the 16th and 20th August, the disease was more virulent in the 7th Hussars than at any other period.

On the 23rd, Cholera re-appeared in the camp, two men being attacked on this day, and there was another case on the 24th. No cause can be assigned for this fresh outbreak. There were, on the same two days, three cases in Cantonments. After this the only cases were one in camp on the 27th August, and one in Cantonments on the 4th September.

"Of the total number, 61, attacked," writes Dr. Sinclair Smith, the Surgeon of the Regiment, "15, or nearly one-fourth, were patients in hospital suffering from various ailments, *viz.*, 9 from bowel affections, 2 from agues, 1 from pulmonary consumption, 1 from hepatic inflammation, 1 from disease of the heart, and 1 from venereal disease." "Of the remaining 46 cases," says Dr. Smith, "10 occurred in men who either were attending on the sick, or had attended on them two or three days before. * * * Many men attended on patients without themselves contracting the distemper, but not a few fell sick, and that in a manner too uniform, and following too closely on the attendance to be accounted for by chance or coincidence. The following are a few examples:—A man was seized, and during his illness was attended by a comrade; the latter was attacked, and was nursed by his wife, who also contracted the disease, and was in turn attended by an orderly. The latter likewise fell ill, and all four died. An orderly, in raising a patient in bed, became sensible of a very disagreeable smell, which was so overpowering as to occasion faintness. The orderly ailed for two days, when he suffered a severe attack of Cholera, from which, however,

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ultimately recovered. The Band-master of the Regiment having contracted the disorder, was attended by a Soldier, who soon afterwards fell sick with Cholera. The latter was attended by another Soldier, and he too contracted the disease. The Band-master recovered, and the two Soldiers died. Were it necessary, examples of the above kind could be multiplied."

Thus, nearly 41 per cent. of the whole number of cases of Cholera in this Regiment were apparently connected, in one way or other, with the hospital. The average daily healthy strength of the Regiment during the Epidemic was 788, and the average daily number of patients in hospital, during the same time, with diseases other than Cholera, was 83. While the percentage of cases of Cholera to healthy strength was 5·8, no less than 18·1 per cent. of the patients in hospital were attacked. These figures, however, do not fully represent the virulence of the disease in the hospital, because they do not include cases that occurred among men employed in attendance on the sick. The number of men who were thus employed could not be ascertained. Cholera patients were treated in a good and airy room, forming a separate ward of the hospital. Each patient was attended by two of his comrades, who volunteered for the duty. These were generally relieved every two hours, and they were not exposed to any great fatigue. There was no great prevalence of diarrhœa before or during the Epidemic. Medicines were given to Non-Commissioned Officers for distribution in the barracks, and orders were issued with the object of detecting at once any premonitory symptoms of Cholera.

It will be seen from the Table already given, that the women and children, and especially the latter, suffered severely. All the cases of Cholera among the women and children occurred after the men had gone into camp; and they were exposed for a longer time to the injurious influences which were evidently present in the Cantonment.

The 7th Hussars arrived in Calcutta from England in November 1857. During 1858 the Regiment was employed on service in Oudh, and it reached Umballa in April 1859. After their arrival the health of the men was generally good, and it was especially so during the hot months immediately preceding the outbreak of Cholera. The duties had been generally light; there was nothing in them likely to have an injurious effect, and the general arrangements for promoting the health and comfort of the men of the Regiment were excellent. On the 2nd August a man was attacked with Cholera. After this there were no more cases in the Regiment until the 16th August. On this and the four following days five men were attacked. The disease again ceased until the 28th

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August, when there was one case, and on the 1st and 2nd September there were three cases. Cholera then disappeared from the Regiment. Altogether there were ten cases, of which eight were fatal. No women were attacked, and only one child.

The Regiment did not go into camp.

All the cases that occurred in the 7th Hussars were admitted from the four barracks, or from the hospital, on the left, nearest to the Infantry lines, while the men living on the higher and better drained ground further to the right escaped altogether. The same was true of most of the cases of diarrhœa that occurred during the prevalence of the Epidemic.

Of the ten men attacked in this Regiment, two were patients in hospital, and one had been discharged the day before he was seized with Cholera. These three men were all suffering from bowel complaint. None of the hospital orderlies were attacked. Their duties were reduced as far as possible, and they were only employed during the worst stage of the disease. The Hospital Establishment entirely escaped. Cases of Cholera were treated in small rooms separated from the rest of the hospital. The excreta of Cholera patients were immediately buried. Mattrasses, clothing, and linen used by them, were either burned or were purified with chloride of lime. The general management by Dr. Kendall, the Surgeon of the Regiment, appears to have been very judicious. Diarrhœa is said to have preceded the attack of Cholera in nearly every case. Medicines were given to Non-Commissioned Officers for administration in barracks, and orders were issued for promptly reporting suspicious symptoms.

During the greater part of the previous year, when they had been stationed at Umballa, the health of the Artillery had been very good. The Regimental arrangements connected with the care of the men, their duties, and diet, had been well attended to. There was some prevalence of diarrhœa during the Epidemic of Cholera. In three of the cases of diarrhœa admitted on the 7th and 9th August, there were Choleraic symptoms, but no case of actual Cholera occurred.

No European Officers were attacked by Cholera at Umballa.

The Table already given will show that there was very little Cholera among the Native Troops. The few cases that occurred among the Native Infantry presented no circumstances requiring special notice.

It is hardly possible to value too highly the services which Officers in high command have the opportunity of rendering while pestilence is raging among their men. Soldiers at such a time often become panic-stricken and desponding, and the duty of their Officers is then as plainly marked out as it would be upon the field of battle.

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Sir Robert Garrett, who so often had distinguished himself against other but not more formidable enemies, had to fight at Umballa not the least honorable or the least difficult action of a long and laborious life. During the prevalence of Cholera he was always to be found where he knew that his presence was required. He was constantly in the barracks and camps and hospitals, speaking kind and cheering words to all, and instilling into every one a portion of his own courage and of his own indomitable energy. It was hardly possible that either Officers or Men should be dispirited when such an example was set before them by their General.

These efforts were worthily seconded by Dr. Brown, Deputy Inspector General of Hospitals, whose long Indian experience and sound judgment were at such a time especially valuable. The Military and Medical Regimental Officers exerted themselves to the utmost, and every thing was done by them which at the time seemed likely to prove of any advantage.

KURNAL. THANESUR. ROHTUK.

In the Districts of Kurnal and Thanesur, lying to the south of Umballa, and between that station and Delhi, Cholera was prevalent among the Native population early in July. At Kurnal it seems to have commenced about the end of June, to have reached its climax about the end of July, and to have ceased about the middle of August. The disease was commonly believed to have spread gradually from Delhi along the Grand Trunk Road; but no trustworthy facts bearing upon this point could be learned. There are no European Troops in these Districts. In the town of Kurnal, which contains a population of about 19,000 persons, 365 cases and 84 deaths are reported to have occurred. In the Poor-house there were 43 cases and 22 deaths, the daily average number of the inmates being 788. In the Jail, which contained 55 prisoners, there was only one case of Cholera.

In the District of Thanesur, the first case is said to have occurred on the 10th July, and on the 17th July the town of Thanesur was attacked. Between the 1st and 8th July a great fair and religious festival was held at Thanesur, at which 200,000 persons are said to have been present, and it was commonly believed that Cholera was brought into the town with this great assemblage of people. Thanesur contains about 11,000 inhabitants, and among them 223 cases of Cholera are reported to have occurred. In the Poor-house, which contained 443 persons, there were 98 deaths from Cholera. In the Jail, among 550 prisoners, there were 10 cases and 5 deaths. The number of paupers in the Poor-house in the interior of the District was 4,837,

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and of these, 230 died from Cholera. The total number of cases of Cholera in the District of Thanesur is said to have been 3,581, of which 2,074 were fatal. These numbers, however, are only supposed to be approximately correct. The total population of the District is about 475,000. The disease is said to have commenced at the south-eastern extremity of the District, but to have subsequently followed no particular course in its progress. It ceased about the beginning of September. This District suffered severely from the famine, and the poorer classes were, during the hot season, in a condition which rendered them very liable to the attacks of epidemic disease.

In the town of Rohtuk, 40 miles north-west from Delhi, Cholera seems not to have appeared until August. It broke out in the Rohtuk Jail on the 17th August, and among 413 prisoners there were 59 cases of Cholera and 25 deaths.

There is no information regarding the Epidemic in the District of Hissar beyond Rohtuk on the west, but it is reported not to have been virulent.

DELHI.

Before the mutinies of 1857, Delhi was considered one of the most unhealthy of our Military stations in Northern India, and for this reason it had long ceased to be occupied by European Troops. The city is situated on the right bank of the Jumna, close to the river. The old Military Cantonments were about three miles to the north, and separated from the city by a low ridge of rocky hills. They were destroyed at the outbreak of the mutiny, and have not been re-occupied, the European garrison since 1857 having been stationed in the Palace, or in its vicinity, inside the walls of the city.

It is necessary that this change of locality should be clearly understood, for the bad reputation for healthiness which the former Cantonments of Delhi had long deservedly borne, is often wrongly attributed to the present quarters of the Troops. The following remarks are quoted from a report by Dr. Balfour, who was for several years Civil Surgeon of Delhi.

" Delhi has been supposed to be very unhealthy, but unjustly so as regards the city. The idea has no doubt arisen from the heavy sickness annually affecting the late Cantonments, and from the character of the country round Alleepoor and portions of the bank of the Western Jumna Canal. In ordinary years the health of the city must be considered above the average, as regards large towns. True, that occasionally there is a great increase to the fever, which is the chief complaint here, but these outbreaks are neither frequent nor fatal. * * * The grand

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disease of Delhi is fever of the remittent and intermittent type, but if taken in time it is not generally difficult to treat, or dangerous. * * Other diseases, sun-stroke, small-pox, syphilis, &c., &c., prevail at Delhi, but not, I think, more than at other stations. But Delhi has the advantage of a great immunity from Cholera. Between 1845 and 1856 no outbreak occurred in the city or neighbourhood, although, I believe, the large stations in the Doab suffered more than once during that period, and, even when this scourge does break out, it affects comparatively few. Thus, in 1845, I have found it recorded that, in a population of upwards of 150,000, there were only 708 deaths; and in 1856, 864 were carried off. This, compared with the mortality in other places, Agra for instance in 1856, is most favorable. I consider the city of Delhi to be, as it now stands, more healthy than most large towns, and to be capable of great improvements by opening wide streets, clearing away some of the most crowded localities, and by improved drainage and general conservancy."

No statistical data exist, but there can be no doubt that Doctor Balfour's opinion regarding the general healthiness of the city of Delhi is in accordance with the common belief of the Native population. It may be doubted whether any of the large cities of Northern India bear, in popular opinion, a better character in this respect.

These conclusions are quite in accordance with those of the Committee appointed in 1845 to report on the causes of the unhealthiness of Kurnal and other portions of the country along the line of the Delhi Canal. Dr. Dempster, a Member of that Committee, gives the following account of the result of his enquiries at Delhi:—"Within the walls, and especially in the most dense and crowded quarters of the city, there were comparatively few indications of pure malarious disease. This accords with what has often been remarked in other countries, *viz*, that the high walls, and narrow crowded smoky streets of large cities, are frequently a safeguard against marsh miasma, although other causes of disease may abound in such situations. In the Cantonment Bazar, and suburbs outside the walls, a considerable amount of spleen disease was found. But when we proceeded to examine the villages situated on the verge of the low moist "Khadir" land, immediately in front of the old Sapper lines, (a position now abandoned in consequence of its extreme insalubrity,) the test at once pointed out malaria in its highest intensity."

The extreme unhealthiness of the old Cantonments has usually been attributed to their proximity to an extensive tract of swampy ground, called the Nujjufgurh Jheel, ten or twelve miles south-west from Delhi. The correctness of this opinion, however, is questionable, and it seems probable that the cause should rather be looked for in the station itself, and in the nature of the ground in its immediate vicinity. Whatever

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may be the true explanation, there can be no doubt that the old Cantonments of Delhi were specially exposed to malarious influences, from which the city is apparently protected by the ridge of hills on the north.

There is, however, one disease which is more common in the city than in the country round. This is the well-known Delhi boil, or Aurungzeb. The European Troops suffered very severely in 1859 and 1860 from this troublesome and often intractable affection. It is curious that the extreme prevalence of these boils is only observed in the city. In the old Cantonments they were comparatively rare, and even at so short a distance from the city as the Civil station outside the Cashmere gate, they are said to be by no means common. Nothing is known regarding their cause, and they prevail more or less at all seasons. The Natives chiefly suffer from them during the hot months, but Europeans appear to be more subject to them in the winter.

During the siege of Delhi in 1857, our Troops occupied the old Cantonments and the ridge overlooking the city, and suffered severely from Cholera and other sickness. After the capture of the place, the permanent occupation of the Palace and city by a European Force was, on Military grounds, considered necessary, and, so far as past experience enables us to judge, there seems no reason why this necessity should entail any of the special dangers to the health of the Soldiers which have often been anticipated. It appears probable that Delhi may prove, when better accommodation is provided for the Troops, as healthy as many stations which bear a much better reputation.

The city in 1853 contained 152,000 inhabitants. Its population was much diminished by the events of 1857, but it is now again increasing, and Delhi is gradually recovering some part, at least, of its former prosperity. The city lies between the Jumna and the ridge of hills already noticed; and on its eastern side, on the bank of the river, are the Palace and the new Cantonments of the Troops. The fortified Palace constitutes the citadel of the place. It covers a large extent of ground facing the Jumna, about 900 yards long by 500 yards broad, and is enclosed on all sides, excepting that towards the river, with a magnificent wall of red sandstone, between fifty and sixty feet high. Until 1857 it was the residence of the King, and nearly the whole area was covered with buildings filled with a dense population, which is said to have amounted to nearly 14,000 persons. The ground upon which the Palace stands is considerably lower than that occupied by the city.

No European Troops having been stationed at Delhi for many years before the mutinies of 1857, there were no buildings ready for their occupation after the capture of the city. It therefore became necessary to make temporary arrangements for their accommodation. Those portions of the Palace which were available for the purpose were given up to the Troops, and have been occupied by them ever since, while the men who could not find quarters in the Palace were placed in houses outside, near the Cashmere gate of the city. When the Commission visited Delhi, the whole of the European Troops were still accommodated in this manner. Most of the buildings inside the Palace walls have been swept away since the place came into our possession, and only those portions of the old Palace have been retained which were useful for the Troops, or which it was thought right to preserve on account of their architectural beauty or their historical interest.

The most important of the buildings occupied by the Troops is the Dewan-i-am, the noble Audience-hall of the Mohammedan Sovereigns. This has been converted into a barrack, and it afforded good quarters for a Company and a half of Infantry. Three other Companies occupied another fine range of buildings overlooking the river, well raised, and generally not badly ventilated. The chief of these are known as the Summun Boorj and Motee Muhal. Although these native buildings, originally intended for totally different purposes, are most incomplete substitutes for proper barracks, the manner in which the Troops were housed in the Palace was, upon the whole, tolerably good, but the number of men in each building was too great.

The larger half of the Regiment of Infantry station in Delhi occupied the buildings of the Delhi College, the old Residency, and several large Native houses outside the Palace walls. The number of rooms in which the men were quartered were so numerous, and they varied so greatly in all respects, that it is impossible to attempt any description here. For the most part the accommodation was very inferior, and the men were too much crowded. It is true that the cubic space allowed per man generally exceeded 1,000 feet, but the superficial area was too small, and in buildings like these, broken up into a number of small rooms, through which there is often no free passage of air, satisfactory ventilation is hardly possible.

The quarters for married people, both inside and outside the Palace, are generally small, over-crowded, and not well ventilated.

The Infantry Hospital is placed outside the Palace, in buildings ill adapted for the purpose, badly situated, dark, and insufficiently ventilated.

Many of the buildings in which the men are quartered are in close proximity to the streets of the city. Their supervision is therefore very difficult, and the facilities which are thus afforded for procuring liquor, and for other vicious indulgencies, are a fruitful source of demoralization and disease.

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The Artillery are stationed in the quarter called Duryagunj, about half a mile to the south of the Palace, and on considerably higher ground. About 100 men were accommodated in a mosque, overhanging the Jumna, a fine spacious building, but with no sufficient ventilation. Each man had about 1,200 cubic feet of space, and a superficial area of about 70 square feet. About 30 men occupied, as a barrack, the old hospital of the Sappers and Miners. This was intended for a larger number of men, and the men in it were very well housed. The situation is good, and the building is well ventilated. The married quarters are for the most part very indifferent.

The hospital is at a considerable distance from the Artillery lines, in the midst of a Bazar. It consists of an old Native house, built in the English style, not well adapted for the purposes of a hospital, and insufficiently ventilated.

"The Officers of the Garrison," writes the Executive Engineer, "are very nearly as badly off for accommodation as the men. The houses and available quarters are, for the most part, low, badly ventilated, and comfortless."

Altogether, the accommodation provided in 1861 for the Troops at Delhi must be pronounced to have been extremely unsatisfactory. It has been proposed to erect barracks for the whole European Garrison within the walls of the Palace, and some of the works are now in progress. This arrangement appeared to the Commission to be open to very serious objection.

The conservancy arrangements in the Cantonment were considered by the Commission to be more defective than those of any station that was visited. The latrines and urinaries provided for the barracks, inside the Palace enclosure, and for those at the Cashmere gate and the Infantry Hospital, were offensive and objectionable in the extreme. The latrines were upon the surface principle, and the filth was carted away daily to a place about two miles distant, outside the city walls, where it was thrown upon the ground. The construction of the buildings was so excessively bad that no amount of care could keep them in a proper state. The refuse water from the cook-rooms and urinaries in the Palace ran, for the most part, into small shallow cesspools, from which it was afterwards carried away. At the Cashmere gate barracks the urinaries generally communicated with the city drains. Altogether, nothing could well be worse than the practical result of the arrangements. In the Artillery lines things were no better; indeed, they were, if possible, still more objectionable.

The sanitary condition of the Palace, before the outbreak of Cholera, appears to have been bad enough to account, in a great measure, for the

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special virulence which the Epidemic assumed within its walls. "Too much," writes Mr. Campbell, the Executive Engineer, "cannot be said against the sanitary condition of the Palace. It was most foul and offensive. Littered up as the whole area is with ruins and heaps of rubbish, no proper arrangements could be made to prevent the crowd of punkha-coolies, cook-boys, and other hangers-on of the Regiment, as well as the coolies employed on my works, from using the ground about these heaps, and the cells in the arcades still standing, for purposes of nature, although no less than three latrines existed for their use. * * * I doubt whether this filth was ever taken away until the outbreak of Cholera compelled its removal. The whole area of the Palace was therefore, at the time of the outbreak in as filthy a state as it could well be, and the stench in many parts was overpowering, being worst in those portions away from the Europeans, and in consequence nearest my workmen, who had, besides, two most offensive latrines situated close to the principal works on which they were engaged."

Altogether, considering the nature of the accommodation provided for the Troops, and the state of the conservancy arrangements, it is matter for congratulation that the ravages of the Epidemic were not greater.

Mr. Campbell gives the following account of the drainage of Delhi :—

"A thorough system of drainage by means of covered sewers was laid down by the Mogul Emperors both for the City and Palace. This has been modified, or added to, here and there under our rule, and the surface drainage has been a good deal disturbed in places by our extensive demolitions ; but, on the whole, it may be said that the drainage still follows the same lines that it did two hundred years ago, in the time of the Emperor Aurungzebe. I refer, of course, merely to the *wet* drainage. The sewers are not to the same extent as at home the receptacle of every class of filth. No plans or details as to these drains exist in my Office, or in any other in Delhi ; all such were destroyed in the rebellion. It is believed, however, that the only flushing they receive is in the periodical rains. I consider the system of drainage is a good and efficient one. Delhi is not an offensive city, if compared with others having open drains. Nor is the fact of so many of the drains being choked up, and requiring to be opened out at the commencement of the present rainy season, any argument against this. It was due, I believe, wholly, first, to the drought of the past two years, which left to the present rains the task of scouring out a three years' accumulation of sand and filth, the first of which drifts in large quantities through the gratings and openings to sewers ; and, second, to the disturbing influence of the demolitions above alluded to. There is no system of annual repairs to the sewers; they are attended to when necessary. In the present year the bulk of the repairs was done during the rainy season."

The water in Delhi is very commonly brackish, and the wells yielding a good supply of drinking water are not numerous. Their average depth is about 35 feet. Filtered water from the Jumna has been, to some extent, used by the Troops, and its quality is said to be good.

Some account will now be given of the outbreak and progress of Cholera in Delhi and its neighbourhood.

The District of Goorgaon adjoins that of Delhi. It lies further to the south, on the right bank of the Jumna. The Civil Station of Goorgaon is about 18 miles south-west from Delhi. This District suffered more severely from the famine in 1861 than almost any part of the country. Cholera appeared in the south of the District towards the end of May, and it attacked the station of Goorgaon about the middle of June. It was very fatal in the Poor-house, and there were a few cases in the Jail and in the Station Bazar. In the whole District, containing a population of 700,000, about 1,200 deaths are said to have occurred. The Epidemic ceased about the middle of July.

The city of Delhi suffered greatly from the famine. In March 1861, the Revd. C. Sloggett stated, in his report to the Punjab Government, that "more than nineteen thousand persons were fed daily in the city at the different relieving places."

Dr. Smith, the Civil Surgeon of Delhi, has drawn up an excellent account of the Epidemic in Delhi and Goorgaon, and from his report, which has been printed by order of the Punjab Government, the following extracts are made to show the manner in which the disease attacked the Native population of Delhi:—

"At Delhi the disease first made its appearance in the Koodsia Bagh Poor-house, an Asylum into which only the very weakest adults and children had from the first been admitted. It was easy to predict that this would be one of its first points of attack; the place being situated rather low, and within a quarter of a mile of the river bank, and its inmates (many of them already suffering from diarrhœa, the result of exhaustion,) being strongly predisposed to colliquative purging, which at once assumed, even more than usual, the appearance of Cholera. It was on the 11th of June that the first case appeared there. The next was on the 18th. From the 11th instant till the end of the month (19 days) 32 cases occurred, of which 15 terminated fatally. There being about five hundred inmates, on an average, in the Asylum, the atmosphere soon became tainted on all sides, especially from the effluvia arising from the excretions of those who were sick. All the poor were, in consequence, removed to a distance of about two miles from the city walls, and located

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in what used, in former days, to be the Government cattle-sheds. The sick were carefully separated from the comparatively healthy, both in order to facilitate treatment and to protect the latter from the noxious effects of contaminated air. All enjoyed the benefit of entire change of locality, and so sickness was materially diminished, and the health of many a poor creature improved. * * * On the 28th of June the first case of Cholera appeared in the Jail. The patient recovered. It is to be observed that he had come from Goorgaon a few days before. On the following day a female prisoner was attacked; and, although she was under careful and continuous treatment, she died after nineteen hours' illness.

"It is important to note that at this time there was not one single case of diarrhœa in the Jail, and the amount of sickness in the station generally seemed to be below the usual average. I make this remark because it is well known that many Cholera Epidemics are preceded, and introduced, as it were, by the occurrence of a great amount of generally prevailing diarrhœa. It was not so, in the present instance, as regards the city or the Jail.

"During the 30th of June and 1st of July six new cases were admitted; of these three proved fatal within fourteen hours. Thus the Epidemic had fairly set in, four out of the first eight prisoners attacked having died. There were, on the 1st July, 464 prisoners in the Jail; 21 in hospital. Fresh charcoal nets were at once hung up in the hospital, and charcoal powder strewed on the floors; it was also abundantly made use of all around the privies, and in other parts of the establishment where it might prove of use. The hospital was thoroughly white-washed and fumigated, and slaked lime cast in all directions about the compound; more than ordinary attention was paid to the general cleanliness of the prison, to the drainage, the rations, &c., &c. Fifty-seven short-term prisoners were at once released on my suggestion.

"Adjoining the Jail, however, and in part of the same general compound where the Manufactory Department of the prison is carried on, the so-called Delhi-gate Poor-house had, for some time past, been established. It was originally proposed that the poor should only come there to receive their daily allowance of food, but they gradually settled down in the place, and those of them that were sick were there set apart and attended. Thus, when Cholera appeared in the prison, there were in the adjoining Poor-house no less than 597 inmates, of whom 124 were sick. The first cases of Cholera occurred in the Asylum on the 29th of June. Within two days 8 deaths occurred, and about 20 other individuals were attacked. It was at once evident that this state of things could not be allowed to continue; and accordingly the whole of the Delhi-gate

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Poor-house establishment was removed, with the least possible delay, from the vicinity of the Jail, so as immediately and effectually to protect the latter. The poor, sick and well, were sent to a distance of about five miles from the Jail to the old Cantonments, the Koodsia Bagh Poor-house having been transferred there likewise. The sick of the two establishments were brought together, and, as far as it was practicable, a special Cholera Hospital was established. For the inmates of the Delhi-gate establishment who were not sick, shelter was afforded in what was formerly the old Government magazine. These changes proved of decided benefit; from that time the amount of Cholera amongst the poor was considerably diminished.

"The following is an abridgement of the Cholera Statistics of these two establishments:—In the Delhi-gate Poor-house, from 29th June until 7th July, 52 cases,—24 fatal. In the Koodsia Bagh and Delhi-gate Asylums together, from 1st July till the end of July, 83 cases,—31 fatal. As before noted, in the Koodsia Bagh, from 11th to 30th June, 32 cases,—15 fatal. Thus we account for 167 cases, out of which 70 deaths occurred.

"The following statement indicates the amount of relief afforded in the said Asylums, and the extent of general sickness and mortality which prevailed in each of them:—

The largest number of persons receiving daily support in the Delhi-gate Asylum, from 13th March till the end of July	780
The largest number in hospital, in one day ...	145
The total number of deaths which occurred in the time noted	68
The number of deaths from Cholera, from 1st July till the end of the month	55
The largest number of persons fed in one day, during the same time, in the Koodsia Bagh Asylum	783
The largest number in hospital, in one day ...	157
The total number of deaths during the time noted	159

"The disease continued in the Jail until the 8th instant, (10 days after its first appearance there), having in all attacked 35 prisoners, no less than 19 of whom died, although they were all carefully treated from the first. After the date mentioned, no single case occurred. The Epidemic suddenly ceased, and did not re-appear. * * * *

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"The part of Delhi which was next visited by the Epidemic was the Eedgha Asylum, situated about half a mile from the city walls, in a westerly direction. The first case occurred there on the 3rd of July, at which time no less than 6,888 persons were congregated there every morning to receive food. They did not, however, remain in the Asylum during the day, but only whilst food was being distributed. The only permanent inmates were the sick in hospital, of whom there were 250. In the course of eight days, 18 cases of Cholera occurred, of which 10 proved fatal; besides which there were 11 deaths, in the same time, from Choleraic diarrhœa. * * * From the first outbreak of the Epidemic in the Eedgha Asylum, on the 3rd of July, till its final disappearance on the 27th of the month, 50 persons fell victims to it.

The largest number of persons fed in one day at this Asylum, from 13th March till 29th July, was	9,402
The largest number in hospital in one day, during the same period	340

"The total number of deaths which occurred in the same time, 182; of which (as I have remarked), 50 were caused by Cholera. A very large proportion of the remaining 32 deaths were due to diarrhœa and debility.

"On the 4th of July the disease made its appearance in Her Majesty's 82nd Regiment. * * * *

"On the morning of July 6th the first case appeared in the Police Hospital. * * * *

"On the 7th of July the first case occurred in the Artillery lines, at the Hospital Sergeant's Quarters. * * * *

"The first case I was regularly consulted about, in the Native population at large, occurred on the 8th July. The disease, however, had appeared in the city some days before this. * * *

"From the 5th of July onwards the Epidemic continued to prevail in the city and suburbs. Up to the 10th instant 15 deaths occurred. The following tabulated statement shows the number of deaths daily reported at the Kotwalee, as having occurred in the city and suburbs from 10th July until the 6th of August, when the Epidemic had altogether died out in the suburbs, and had only produced three deaths in one day within the city. The 453 deaths added to the 15 which occurred before the 10th instant, gives us a total mortality, *as it has been reported*, of 468. Even if this number were doubled, however, it would afford but a small ratio of deaths when we consider the enormous population of the place.

The following statistics were kindly sent to me (day by day) by Major A. Smith, District Superintendent of Police :—

Return showing mortality from Cholera in City and Suburbs of Delhi, from 10th July till 6th August 1861.

DATE.		City.	Pahargunj.	Subzie-Mundi.	Sudder Bazar.	Total.
July	10 ...	9	2	3	1	15
,,	11 ...	4	2	3	1	10
,,	12 ...	14	6	4	0	24
,,	13 ...	12	4	2	0	18
,,	14 ...	14	4	3	1	22
,,	15 ...	10	12	3	0	25
,,	16 ...	18	5	1	0	24
,,	17 ...	15	4	3	2	24
,,	18 ...	18	0	7	0	25
,,	19 ...	15	10	2	3	30
,,	20 ...	13	9	2	1	25
,,	21 ...	22	7	2	1	32
,,	22 ...	23	7	3	0	33
,,	23 ...	23	7	3	0	33
,,	24 ...	15	1	2	2	20
,,	25 ...	19	0	3	2	24
,,	26 ...	15	7	2	1	25
,,	27 ...	6	4	3	0	13
,,	28 ...	8	0	1	0	9
,,	29 ...	6	5	0	0	11
,,	30 ...	4	1	1	0	6
,,	31 ...	4	1	2	0	7
August	1 ...	7	4	1	0	12
,,	2 ...	5	4	1	0	10
,,	3 ...	6	2	2	0	10
,,	4 ...	3	2	0	0	5
,,	5 ...	3	0	0	0	3
	Total ...	285	101	54	13	453

* * * *

" From a view of the facts above adduced, it is shown that the disease first cropped out in the very fittest field for havoc, and that the persons earliest seized were those who had suffered most from want and its attendant miseries. Secondly, that it made its next appearance at the opposite side of the city, attacking, almost simultaneously, another Poor-house, and the Jail shut up by high walls and consequently ill-ventilated. Passing on, it re-appeared in a third Poor-house, situated on a much higher level and more healthy site than the other two. It next visited the city and its suburbs, the Police Hospital, and the lines of Her Majesty's 82nd Regiment. Lastly, it appeared in Cantonment Quarters of the city. * * *

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"The first man who was attacked in the Jail on the 28th June arrived, on the 25th instant, from Goorgaon, where the disease was prevalent. This is worthy of remark. He was two days on the way, so that the time which elapsed between his exposure to infection at Goorgaon and his attack in Delhi was five days. The second case, however, was that of a woman, who was imprisoned in a part of the Jail walled off from the male prisoners, so that it is impossible that she could have been affected by any direct influence emanating from the individual first seized. These facts lend support to the theory that Cholera may either be spread by human intercourse, or entirely independent of it. In the one case it seems to have been transported from place to place, in the other it was of local origin. Not one of the attendants on the sick of the Jail were affected; it has been already stated, however, that one Native Doctor died at his post in the Eedgha Asylum. No particular *limitation* of the disease could be detected within the prison.

"It is a well ascertained fact that lunatics are peculiarly liable to Cholera; there happened to be one man in the Jail under suspicion of insanity. He was very severely attacked, but ultimately recovered.

"In the city the disease, as usual, effected its principal ravages where there was over-crowding, want of cleanliness, or decomposition of vegetable matter going on—and consequently an impure atmosphere. The cessation of the Epidemic, at the different localities already alluded to, was by no means simultaneous."

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The following Table shows the strength of the European Troops stationed at Delhi at the commencement of the Epidemic, and the cases of Cholera that occurred among them :—

REGIMENT.	STRENGTH.			CASES OF CHOLERA.						PERCENTAGE.								
				Men.		Women.		Children.		Cases to Strength.			Deaths to Strength.			Deaths to Cases.		
	Men.	Women.	Children.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Men.	Women.	Children.	Men.	Women.	Children.	Men.	Women.	Children.
H. M.'s 82nd Regiment ...	1,105	72	84	95	44	14	7	14	5	8·6	19·4	16·6	3·9	9·7	5·9	46·3	50·0	35·7
Artillery Division ...	162	28	36	25	8	4	1	2	2	15·4	14·3	5·5	4·9	3·6	5·5	32·0	25·0	100·0
Total ...	1,267	100	120	120	52	18	8	16	7	9·5	18·0	13·3	4·1	8·0	5·8	43·3	44·4	43·8

The following Table gives similar particulars for the men of the Native Regiments :—

REGIMENT.	Strength.	CASES OF CHOLERA.		PERCENTAGE.		
		Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.
13th Regiment Bengal Cavalry	385	16	4	4·1	1·1	25·0
13th Kelat-i-Ghilzie Regiment N. I.	790	12	5	1·5	0·6	41·7
Total ...	1,175	28	9	2·4	0·7	32·1

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The 82nd Regiment arrived in Calcutta from England in November 1857. During a considerable part of the following year it was employed in the North-Western Provinces on service in the field, and the men suffered severely from fever and sun-stroke. In 1859 and 1860 the Regiment was stationed at Shahjehanpore and Moradabad, where the men were generally healthy, and in April 1861 it arrived at Delhi. The health of the Regiment at Delhi was tolerably good during 1861, and in the earlier part of 1862. Shortly before the outbreak of Cholera, there was nothing remarkable in the amount of sickness, or in its character. In June 1861 there was no unusual prevalence of diarrhœa, but cases became numerous after the Epidemic commenced.

There was nothing in the duties of the men, or in any of the details of their management, which seemed likely to have predisposed them to the attack of the disease.

The Bengal Artillery* stationed at Delhi during the Epidemic were raised in August 1859, and had been quartered in Delhi ever since. The health of the men had been indifferent; they had suffered much from fever and boils, and there was a great prevalence of venereal diseases. The duties of the men were moderate in amount, and not likely to be in any way injurious to their health. In the general arrangements there was nothing peculiar.

The first case of Cholera among the European Troops occurred on the 4th July. On this day a patient suffering from fever in the hospital of Her Majesty's 82nd Regiment was attacked. On the 5th July a case was admitted from the Cashmere-gate barracks, and on the 6th, another patient who was suffering from orchitis was seized in the hospital. These three cases were all fatal. On the 7th and 8th there were no fresh cases, but on the 9th July the disease re-appeared, and after this date cases continued to occur every day until the 1st August. On the 9th and 10th July there were two admissions from the Cashmere-gate barracks. Hitherto the Palace had been free from Cholera, but on the 11th two cases occurred there, and from this time forward the men in the Palace suffered far more severely than those who were quartered outside.

The tendency of the disease to attack the patients in the hospital continued. Up to the 19th July there were altogether 51 cases in the Regiment. Of these, 29 cases occurred in the Palace, 13 in the Cashmere-gate barracks, and 9 in the hospital.

The propriety of moving the men into camp had for some time been under discussion. On the 20th July two Companies of the 82nd

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* 4th Company, 1st Battalion; 1st Company, 4th Battalion; 4th Battery, 16th Brigade; 1st Battery, 24th Brigade.

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Regiment, strength 141 men, were sent into camp near the Kootub, and on the 22nd July two more Companies, consisting of 156 men, followed. As the change was clearly beneficial, and as Cholera continued to be virulent in the Cantonments, nearly all the men who remained in the Palace, 127 in number, were sent on the 27th July into camp, on the ridge of hill close to the city on the north.

Up to this date there had been altogether in the Cantonment 80 cases of Cholera and 39 deaths. They were distributed as follows:—

	Cases.	Deaths.
Admitted from Palace	49	26
,, ,, Cashmere-gate barracks... ...	19	6
,, ,, Hospital	12	7

The average daily healthy strength in the Palace was during this time 338; in the Cashmere-gate barracks 505; and the average number of patients in hospital with diseases other than Cholera was 95. We have therefore the following comparative results:—

PLACE.	PROPORTION PER CENT.		
	Cases to Strength.	Deaths to Strength.	Deaths to Cases.
Palace	14·5	7·7	53·1
Cashmere-gate barracks ...	3·8	1·2	31·6
Hospital	12·6	7·4	58·3

These figures show plainly the virulence of the disease in the Palace and in the hospital, and the comparative exemption of the Cashmere-gate barracks.

The results of the removal of the men into camp at the Kootub were clearly beneficial. During the six days ending with the 27th July, there were 18 cases and 12 deaths among 157 men in the Palace, while there were 6 cases and 3 deaths among 292 men in the camp. The percentage of cases to strength was in the Palace 11·5, and of deaths to strength 7·7, while in the camp the percentage of cases to strength was 2·0, and of deaths to strength 1·0. The men in the Cashmere-gate barracks were even more healthy than in the camp, but this comparison cannot be fairly made, because two-thirds of the men in camp had been moved from the Palace, and among those who went into camp from the Cashmere-gate there were no fatal cases.

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The results of the removal of the men on the 27th July from the Palace to the camp on the ridge were very satisfactory, for not a single case of Cholera occurred in this detachment.

After the 27th there were a few mild cases, none of them fatal, among the children in Cantonments, and on the 31st July a woman was attacked and died. On the 1st August there was a fatal case in the Cashmere-gate barracks, and on the same day a man was attacked in the Palace, but recovered. These were the last cases that occurred. In the camp at the Kootub there were six admissions between the 28th July and the 1st August. Five of these cases were originally returned as cases of Choleraic diarrhœa, and all of these ended favorably. The sixth case was one of confirmed Cholera, and proved fatal. After the 1st August there were no more cases of Cholera in the camp. Altogether, in this detachment, the average daily strength of which was about 270 men, there were, in the 13 days between the 20th July and 1st August, 14 cases of Cholera. Of these, 5 cases, or 35·7 per cent., were fatal.

Although the results of the removal to the Kootub were satisfactory, they might probably have been still more so had not the camp remained so long in one place. As the disease did not altogether disappear a few days after the first encampment of the men, it would have been desirable to have moved the camp.

The following Table, which is extracted from Dr. Fowler's Report, gives the number of cases of Cholera and deaths in each Company quartered in the Palace :—

Company.	Cases.	Deaths.
No. 1	17	7
„ 2	8	5
„ 3	5	3
„ 4	11	7
„ 5	8	4
Total	49	26

No. 1 Company, which suffered so severely, occupied the Dewan-i-am, or Audience-hall, which, as already noticed, is a fine building with perhaps better accommodation than any other provided for the Troops in Delhi. The large number of cases in this Company, and in No. 4 Com-

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pany, which was also well housed, appears to be explained by the fact that these two Companies remained longer in the Palace than any other part of the Regiment. They did not leave the buildings, about which Cholera was evidently hanging, until the 27th July, when they marched to the camp on the ridge, getting rid thereby of the disease at once. Independently of this, however, there was apparently some cause which rendered the Dewan-i-am barrack more than commonly liable to attack. Several of the earliest cases in the Palace occurred in it, and No. 2 Company, a portion of which was also quartered there, lost several men before it was sent into camp on the 20th July.

Companies Nos. 3 and 5 marched to the Kootub on the 22nd July. They, as well as No. 4 Company, occupied the Summun Boorj and the other buildings in the Palace, which have been already noticed.

The following Table shows the number of cases and deaths in each Company in the Cashmere-gate barracks :—

Company.	Cases.	Deaths.
No. 6	3	1
,, 7	7	4
,, 8	5	1
,, 9	4	0
,, 10	1	0
Total ...	20	6

Most of the men belonging to Companies Nos. 6, 7, and 8, were quartered in the buildings of the Delhi College. Three out of the four fatal cases in No. 7 Company were admitted from one small room. Companies Nos. 9 and 10, in which there were no fatal cases, occupied buildings on higher ground, but which, in other respects, have no apparent superiority. Some of the rooms, indeed, which escaped attack, are among the worst in the whole Cantonment. No. 7 Company was the only one moved into camp from the Cashmere-gate. After this measure was carried out, there were no more fatal cases among the men of the Company.

The details that have been already given show the virulence with which Cholera attacked the patients in hospital with other diseases.

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14·8 per cent. of the total number of cases in Cantonments, and 17·9 per cent. of the deaths, occurred in the hospital. Among the patients attacked with Cholera, two were under treatment for fever, one for orchitis, three for hepatic disease, one for phlegmon, one for diarrhœa, and three for syphilis.

The character of the accommodation provided for the sick has been already noticed, and it was not possible, in buildings so constructed, that the arrangements should be altogether satisfactory. Dr. Fowler and the other Medical Officers did, however, everything in their power, and the measures which they adopted were judicious. So far as was practicable, Cholera patients were treated separately. Hospital orderlies were supplied in the ordinary manner, but they were never very numerous, for there was at no time any great accumulation of patients in the worst stage of the disease. Only one orderly appears to have been attacked by Cholera. Among the native servants attached to the hospital, 96 in number, there were three fatal cases. None of the medical subordinates were attacked.

It will be observed that only 46·3 per cent. of the cases of Cholera among the men of this Regiment proved fatal. This is an unusually small proportion. It is, however, almost impossible to compare the results of the treatment at different stations, because Medical Officers differ so constantly in opinion regarding the manner in which, during an Epidemic, true cases of Cholera ought to be defined. Thirty-one out of the ninety-five cases in the 82nd Regiment were originally recorded as Choleraic diarrhœa, but Dr. Fowler has explained that these cases, although they did not proceed to the stage of collapse, all offered the unmistakeable symptoms of Cholera, and they have therefore been included by him as true cases of the disease. During the prevalence of the Epidemic, no less than 110 cases of ordinary diarrhœa were treated in the hospital of the 82nd. The men were inspected in their barracks twice every day by the Medical Officers during the whole course of the Epidemic, and measures, which were often successful, were taken for bringing to notice the existence of symptoms which, if not checked, might probably pass into those of Cholera. Medicines were given to the Sergeants of Companies, with instructions for their distribution in barracks. It was found that the men were generally unwilling to apply for medical treatment, and there was a strong disinclination to being sent to hospital. Almost every case of Cholera is said to have been preceded by diarrhœa.

The Regimental and Medical Officers exerted themselves to the utmost during the Epidemic. Colonel James Abbott, who commanded the Artillery, took command of the station on the 27th of July. From first to last there was no duty which Colonel Abbott did not discharge in

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the manner which might have been expected from so well-known and so distinguished a Soldier.

On the 7th July Cholera appeared in the Artillery Division. The first person attacked was the Hospital Sergeant, who occupied a room in the hospital building. On the same day there were two cases among the patients in hospital with other diseases, and one among the men of the hospital guard. One of the hospital patients was suffering from fever, and the other from gonorrhœa. The fifth case occurred in barracks. On the following day a man and a child were attacked in barracks, and the disease continued until the 17th July, when it ceased.

The Artillery were not moved into camp.

All the cases among the men in barracks occurred in the mosque, and none of them in the old Sapper Hospital, the superior sanitary condition of which has been already noticed. Among the patients in hospital with other diseases, there was one more case on the 15th July. This was a man suffering from disease of the heart. There do not seem to have been any cases of Cholera among men employed on orderly duty in the hospital. There was one case among the Native Hospital establishment, and the Apothecary and his child were also attacked.

Although the disease soon disappeared from the Artillery at Delhi, it was virulent while it lasted, and that in proportion to their strength, the Artillery lost more men than the Infantry. Out of the 25 cases that occurred, 20 per cent. apparently had their origin in the hospital, either among the patients or the guards. The average number of patients in hospital with other diseases during the prevalence of the Epidemic was 16. Of these, 18·7 per cent. were attacked by Cholera, while the percentage of attacks to healthy strength was 13·7.

Regarding the disease among the Native Troops there is not much to report.

In the 13th Regiment Bengal Cavalry, Cholera appeared on the 6th July. The first man attacked was a patient in hospital suffering from fever. On the following day a case was admitted from the lines. There were altogether six cases up to the 11th July, and Dr. Wilson, who was in medical charge, then recommended that the Regiment should be moved into camp. On the 12th the Regiment marched accordingly to the Kootub, a distance of about eleven miles. The results of the move were considered by the Surgeon to be very satisfactory. Altogether eight cases occurred in camp, but of these, two were on the day after leaving Delhi, and in one of the others, some days later, the disease was apparently contracted during a visit to a part of the city where Cholera was prevalent. There were only two deaths among the men attacked in camp, and both these cases were among those which seemed to have had their origin in the city. The last case occurred on the 3rd August, and there were altogether in this Regiment 16 cases and 4 deaths.

In the Kelat-i-Ghilzie Regiment (13th N. I.) Cholera first appeared on the 6th July, and the last case occurred on the 30th July. The Regiment did not leave the Cantonments. Twelve men were attacked with Cholera, of whom five died. There are no special circumstances connected with the disease in this Regiment which require to be noticed.

There were no cases of Cholera among the European Officers at Delhi, nor among the other European residents.

MEERUT DIVISION.

Mr. Williams, Commissioner of the Meerut Division, interested himself greatly in the inquiries of the Commission, and procured, through the Magistrates of the Districts subordinate to him, fuller information regarding the progress of the disease among the Native population than could be obtained from most other parts of the country. No machinery existed for collecting complete statistical information on such a subject, and it is not pretended that these details are entirely trustworthy. They may, however, be considered approximately correct, and it is desirable to place on record the following summary of the facts that were obtained regarding the Epidemic in this extensive tract of country.

The Meerut Division includes the most northerly portion of the Doab, or country between the Ganges and Jumna, and it extends from the points where these rivers enter the plains from the Himalaya, down nearly to the latitude of Agra. The length of the Division from north to south is about 200 miles; its average breadth from east to west is 50 miles; its area is about 10,000 square miles; and its population exceeds 4,500,000. It includes the Districts of Allygurh, Bolundshehur, Meerut, Mozuffurnuggur, Saharunpoor, and Dehra Doon. The only station in the Division that has been permanently occupied by European Troops is Meerut. The wing of a Regiment has lately been stationed at Roorkee, the Head Quarters of the Ganges Canal Establishments, in the District of Saharunpoor.

ALLYGURH.

Allygurh is the most southerly of the Districts of the Division. Its area is 2,150 square miles, and its population exceeds 1,000,000. It contains several considerable towns. The main line of the Grand Trunk Road passes through the District, and is joined at Allygurh by the branch road from Agra.

Cholera is said to have first appeared at Atrolee, in the north-west of the District, on the 23rd May, and in June and July it became pre-

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valent in many parts, although it was no where very virulent. It appeared in the city of Coel, the principal place in the District, on the 16th June, and continued there until the 14th August. During this time, out of a population of about 55,000, there were reported 181 fatal cases of Cholera. No cases occurred in the Allygurh Jail. Regarding the total mortality in the District there is no information, but it was certainly not great. The disease was chiefly prevalent from the end of June to the end of July, but it did not disappear from the District until about the 20th September, when the last case is said to have occurred at Secundra Rao, a town on the Grand Trunk Road in the south-eastern portion of the District. Regarding the progress of the Epidemic, Mr. Webster, the Joint Magistrate, states, as the result of his inquiries, that "the Cholera did not follow any line of human communication, or the course of any river or canal, or indeed any definite track or course whatever through this District, but appeared here and there irregularly; in some instances breaking out on the same day at places upwards of 20 miles apart." The following list shows the dates upon which Cholera is reported to have appeared and ceased in the various places in this District :—

DISTRICT.	Name of Place.	Date of first case of Cholera.		Date of last case of Cholera.	
Allygurh	Atrolee ...	23rd May	1861	31st August	1861.
„ ...	Mokumpoor ...	25th „	„		
„ ...	Pilkhunna ...	1st June	„	17th July	„
„ ...	Tarsara ...	10th „	„	17th June	„
„ ...	Jethari ...	10th „	„	3rd July	„
„ ...	Coel ...	16th „	„	14th August	„
„ ...	Kartulla ...	20th „	„	2nd July	„
„ ...	Bamotee ...	20th „	„		
„ ...	Punetee ...	1st July	„		
„ ...	Jarthowlee ...	1st „	„	9th „	„
„ ...	Chundos ...	9th „	„		
„ ...	Tuppul ...	10th „	„	12th August	„
„ ...	Khyr ...	12th „	„		
„ ...	Baree ...	15th „	„	15th „	„
„ ...	Nanow ...	17th „	„		
„ ...	Hatras ...	20th „	„	21st „	„
„ ...	Bhankree ...	22nd „	„		
„ ...	Julalee ...	22nd „	„	25th „	„
„ ...	Beiswan ...	23rd „	„		
„ ...	Thekapoor ...	11th August	„		
„ ...	Edilpoor ..	20th „	„		
„ ...	Pahareepoor ...	28th „	„	10th September	„
„ ...	Secundra Rao	20th September	„		

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BOLUNDSHEHUR.

North of Allygurh lies the District of Bolundshehur, bounded on the east by the Ganges, and on the west by the Jumna. The Grand Trunk Road to Delhi runs through the District, and a branch from Meerut joins the main line at Khoorja. The area of the District is about 1,800 square miles, and the population nearly 800,000. We quote from an excellent Report sent to the Commissioner of Meerut by the Collector, Mr. Lowe, the following account of the Cholera Epidemic in Bolundshehur :—

"At the time of the outbreak of the late Epidemic, and for some months previously, there was no noticeable prevalence or absence of diseases ordinarily present at the same season. It is true that the general distress caused by the severe famine compelled the poorer classes to wretched and unwholesome food, and that fevers and dysentery were, in consequence, more frequent than usual; yet those diseases were in a much milder form than, under the circumstances, might have been expected. Cholera first appeared at a village called Dusehra, on the Grand Trunk Road, about six miles to the south of Khoorja, and twenty-four to the north of Allygurh. * * * Cholera broke out in this village between the 8th and 15th June. It reached Khoorja between the 15th and 22nd; Mamun Chokee, also on the Grand Trunk Road, and four miles to the north of Khoorja, on the 18th; Bolundshehur, five miles further up, on the 25th, having first attacked the Jail on the 21st. * * * The reports for other portions of this District are very doubtful, and, in some instances, evidently incorrect. The disease appears to have ceased in Khoorja on the 8th August. At Bolundshehur cases occurred until the 27th August, and there was a sporadic case on the 19th September. * * * No particular circumstance appears to have affected the course of the Epidemic; it crossed and moved directly contrary to the currents of water, and of the winds, at the commencement, and when the wind blew in a direction favorable to the course of aerial miasmata, the Epidemic did not appear to advance with any greater velocity than before. No physical condition seems to have checked or facilitated its course. Nor did the Grand Trunk Road, with its never-ceasing stream of passengers and traffic, appear in any way to be a good conductor. * * * The largest number of cases occurred at Khoorja, where the population is the most dense of any of the towns, but it did not remain there longer than it did at Bolundshehur, where the population is more sparse, the streets cleaner, and the drainage better. Again, in the Poor-house at Bolundshehur, which was crowded, Cholera did not break out till the 30th June, and had almost entirely ceased by the 22nd of the following month. It is also worthy of notice, that the first case in Bolundshehur happened in the Jail, but then only four cases occurred in all, and these at long intervals. There seemed to be no special liability or exemption of any particular class. The Chumars and Lodas in the town of Bolundshehur suffered the most severely, but then it must be remembered that they form the larger portion of the poorer classes of the inhabitants. A good many of the well-to-do people were attacked, —Buniahs, Kayuths, &c., whereas in the Poor-house, where one might have expected to have witnessed the greatest havoc, the number attacked was comparatively small. * * * This District suffered severely from the famine last year, and yet it is said by reliable witnesses that of the two Epidemics, the one of 1856 was ten times the more virulent and fatal. The total number of deaths from Cholera during 1861 did not probably exceed 1,000. No European in this District was attacked. * * *. I am utterly unable to assign any satisfactory reason for the partial or total exemption of villages lying between places which suffered severely. For instance, the Cholera went along the Grand Trunk Road, I presume, from Khoorja, where it assumed a virulent character, to Mamun, 5 miles off, and did not attack a single village *en route*, although the country on either side of the road is, like that in the immediate vicinity of Khoorja, low and badly drained, and was, during the prevalence of the Epidemic, almost entirely under water. No particular class or body of men, as far as I have been able to ascertain, appears to have escaped, either in or in the immediate neighbourhood of the places attacked by the disease. * * * Cholera was most severe in the Pergunnahs of Khoorja and Secunderabad. There was, comparatively speaking, little Cholera in the east, west, and north part of the District, and a large number of villages were altogether free from it."

In the Bolundshehur District Cholera was most prevalent between the 25th June and 25th July, and it had nearly disappeared at the end of August.

MOZUFFURNUGGUR.

The Mozuffurnuggur District lies immediately to the north of Meerut. Its area is about 1,600 square miles, and its population is 680,000.

Cholera is said to have first appeared at Shamlee, the largest town of the District, containing 12,000 inhabitants, about the 22nd July. A few days later it attacked the towns of Jhinjhana and Thanah Bhown, some miles to the north-east and north of Shamlee, and Boodhana further south. At Mozuffurnuggur, and in the Eastern Division of the

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District, it is said not to have appeared until the first week in August. It seems to have been chiefly prevalent in the east of the District towards the Jumna, and the principal mortality occurred in the month of August. The disease diminished early in September, but did not disappear until the end of the month. According to the Police Reports, there were altogether 560 deaths from Cholera in the District; but no confidence can be placed in these figures. The Epidemic appears to have been at no time very virulent.

SAHARUNPOOR.

The District of Saharunpoor forms the most northerly portion of the plain of the Doab between the Ganges and Jumna. It lies immediately below the outer ranges of the Himalaya. The Sewalik Hills separate it from the Dehra Doon, a wide valley bounded on the north by the Himalaya. No cases of Cholera occurred among the Europeans in the District, and the Natives suffered slightly. The total population of the District is about 800,000. According to the Returns furnished to the Civil Authorities, 573 persons were attacked by Cholera, of whom only 41 died; but it is clear that these figures do not deserve the least credit. The first case of Cholera at Saharunpoor is said to have occurred on the 10th July. On the 19th July there was a case in the Saharunpoor Poor-house, and during July and August there were 24 deaths among the paupers. There was one mild case in the Jail on the 20th July.

At Roorkee, Cholera first appeared in the Poor-house on the 23rd July. The number of paupers was 850, and up to the 13th August there were 118 admissions and 74 deaths. Among the Native population of Roorkee and its neighbourhood there were four cases. One case occurred among the Europeans. The wife of a Sergeant belonging to the Thomason College was attacked on the 14th August.

The disease appears to have been no where virulent in the Saharunpoor District. It is said not to have ceased altogether until October.

DEHRA DOON AND MUSSOOREE.

During the hot season of 1861 extensive works were carried on by the Government in the Sewalik Hills, with the object of making a carriage road through the Mohun Pass, to connect Saharunpoor with the Dehra Doon. These works were specially undertaken for the relief of the poor who were suffering from famine in the northern parts of the Doab, and a large number of people were collected. A fatal case of Cholera occurred among the work-people on the 1st April, but there

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were no more cases until the 26th July, when the disease broke out epidemically. During the rest of July, and in August, there were 62 cases and 42 deaths from Cholera. The disease first appeared at the entrance into the hills from the plains, and about the 31st July it reached Dehra, about ten miles distant, and the villages in the neighbourhood.

The portion of the Doon in which the town and station of Dehra are situated, is about 2,300 feet above the level of the sea, and the climate is considerably cooler than that of the plains beyond the Sewalik range.

The 2nd Goorkha (Sirmoor Rifle) Regiment was stationed at Dehra. Two cases of Cholera occurred among the men on the 3rd August, and the disease continued in the Regiment until the 23rd. During this time there were 18 cases, of which seven were fatal.

The population of the Dehra Doon is scanty, and a great part of the District is unreclaimed and covered with jungle. About 260 persons are reported to have died from Cholera during the Epidemic, and it is said that the villages near the Jumna and Ganges suffered the least. Cases of Cholera continued to occur until nearly the beginning of October.

The ranges of the Himalaya, in which are situated the Sanitaria of Mussooree and Landour, rise abruptly above the Doon, at a distance of about seven miles from Dehra. Mussooree is about seven miles from the foot of the hills, and the elevation of the place, and of Landour, which adjoins it, varies from about 6,000 to nearly 7,500 feet. A case of Cholera occurred among the European population on the 1st May, but whether or not it appeared to have originated in the hills, there is no information. No other Europeans were attacked with Cholera during the year. It appears from the Report of Dr. Farquhar, the Civil Surgeon, that towards the end of July, and during August, cases occasionally occurred among the Natives, but there were apparently only seven cases altogether, and all of the persons attacked had either come up from the Doon, where Cholera was prevalent, or had been in communication with others suffering from the disease. On the 23rd and 26th September, however, there were two cases, in which no such communication could be traced. In the neighbouring Hill Districts there are said to have been a few cases of Cholera, but the disease appears to have been no where common among the people of the hills.

MEERUT DISTRICT AND STATION.

The District of Meerut has an area of 2,200 square miles, and a population of 1,089,000. It contains the important Military and Civil station from which the District takes it's name. Cholera is said to have

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first appeared at a village six miles to the north of Meerut, on the 14th June. It broke out in the Sudder and Regimental Bazars of the Meerut station about the 24th June, and cases continued until the end of August. Only 45 deaths are reported to have occurred among the Native population of the Cantonments during this period, but the Magistrate considered this number to be below the truth. The mortality, however, was not large in proportion to the population, which exceeds 20,000. Cholera appeared in the city of Meerut, which contains about 40,000 inhabitants, on the 8th July, and 106 deaths were reported up to the 26th of the same month. The disease then ceased, but it re-appeared early in September, and continued until the end of October; during these two months there were 89 deaths in the city. On the 7th July the first case of Cholera occurred at Happur, a considerable town in the south of the District. At Gurmuktesur, on the Ganges, it was very prevalent for a time, and it continued in the neighbourhood of this place and of Happur until the end of August. At Ghazeeabad, in the south-east corner of the District, on the Jumna, opposite Delhi, Cholera first appeared on the 8th July. It was very virulent in the Poor-house at Ghazeeabad, the number of deaths in eight days being nearly 100. On the 16th July Cholera left Ghazeeabad, and appeared on the same day at Dasnah, 6 miles further east; at Moradnuggur, 8 miles to the north-east; and at Lonee, 10 miles to the north-west. It continued in the Dasnah Sub-Division until the end of August. On the 15th July the disease appeared at Nugla Kethor, on the road between Meerut and Gurmuktesur, and it continued in this part of the District until the end of August. In the Sub-Division of Baghput, a very thriving and populous part of the country, bordering on the Jumna, Cholera appeared at Jasharee, on the Hindun river, on the 18th July. This portion of the District suffered only slightly from the Epidemic. At Sirdhanah, a considerable town about 12 miles north-west of Meerut, the first case of Cholera is said to have occurred on the 7th August. The total number of deaths in the District reported by the Police was 1,446.

Mr. Sapte, the Magistrate and Collector of Meerut, has given the following details, showing the mortality between the 5th May and 31st October in each Sub-Division of his District:—

Name of Tehseel Division.	Population.	Deaths from Cholera.	Deaths from other Diseases.	Deaths from Famine.	Total number of Deaths.	Date of first case of Cholera.	Date of last case of Cholera.
Meerut ...	2,48,635	371	1,233	26	1,630	14 June	31 Oct.
Happur ...	1,77,182	279	1,863	137	2,279	7 July	29 Aug.
Mowanah ...	1,16,595	229	1,163	75	1,467	15 July	31 Aug.
Sirdhanah ...	1,29,441	170	1,454	16	1,640	7 Aug.	... ...
Ghazeeabad...	1,98,161	256	684	167	1,107	8 July	21 Aug.
Baghput ...	2,18,970	141	1,886	10	2,037	18 July	27 Aug.
Total ...	10,88,984	1,446	8,283	431	10,160		

In the Central Prison at Meerut the Epidemic was excessively virulent. The Prison contained, at the outbreak of the disease, 2,533 prisoners. The Jail buildings are situated on low ground, and the drainage was very imperfect. On the 26th July there was a heavy fall of rain, which flooded parts of the Prison enclosure to a depth of three or four feet. On the 27th July the first case of Cholera occurred. In a few days the disease became extremely virulent, and continued so until the 22nd August, when it suddenly abated. The last case occurred on the 24th August, and up to this date there were 664 admissions and 344 deaths. Thus 26·2 per cent. of the whole number of prisoners were attacked by Cholera, and 13·6 per cent. died; 51·8 per cent. of the cases were fatal. Even these numbers do not appear fully to represent the actual virulence of the Epidemic, for it is stated that during the time when Cholera was present, no less than 59 deaths took place, which were attributed to Choleraic diarrhœa.

The information that was obtained regarding this violent outbreak of Cholera is very incomplete. About 600 prisoners were removed, at a late stage of the Epidemic, from the Jail to the Stables in the old Cavalry lines. The Superintendent of the Prison does not seem to have thought that any advantage resulted from the change; but the facts are not sufficiently known to authorize any opinion being given here upon the subject.

The conservancy of the Jail is very carefully attended to, and the prisoners do not seem to have been overcrowded. The situation, however, is not good, and the inmates of the Jail have, on former occasions, suffered severely from fever and other diseases.

In the 23rd Regiment N. I. the first case of Cholera occurred on the 19th July, and the last on the 3rd August. There were altogether four cases and two deaths. There are no circumstances connected with them that appear to require special notice. The part of the station in which the Native lines are situated has the reputation of being very healthy, and it escaped during the Cholera Epidemic of 1856.

The Military station of Meerut has long been one of the most important in Northern India, and it has always been considered one of the healthiest. Not only is the climate good, but the accommodation for the Troops, although, in some important respects, objectionable, is better than that provided in most of our Cantonments. The place has been generally improved and cared for to a greater extent than is common in these Provinces, and there are, upon the whole, few stations which possess so many advantages as a residence for Europeans. The Cantonments are situated about two miles to the north of the city. The barracks of the European Troops occupy the northern side of the station, along which they extend for about two miles, in a north-west and south-east direction. The Artillery Barracks are upon the east, the Cavalry on the west, and the Infantry in the centre of the line. The lines of the Native Troops, for the most part unoccupied since the mutinies, are situated on the north-west side of the Cantonments. The Civil station adjoins the Military Cantonment on the south-west.

The chief peculiarity of the greater number of the barracks at this station is the small size of the buildings. Each barrack in the Bengal Artillery and European Infantry lines is intended for 30 men only. The buildings, 50 in number, face nearly east and west; they are arranged in four parallel lines, with intervals between each line of 40 yards from east to west, and 30 yards from north to south. Each barrack consists of a large centre room, 50 feet long, 24 feet broad, and 25 feet high. This communicates through open arches with an inner verandah room, and outside again there is a verandah all round. The ends of the inner verandahs are divided off into small rooms for Sergeants. The roofs of the centre portion of the building are thatched; those of the verandahs are flat. When the barrack is occupied by the number of men for which it was designed, *viz.*, thirty, there is an allowance of more than 1,800 cubic feet of space per man, and of nearly 100 superficial feet.

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Thirty-five of these barracks were occupied by the Infantry, on the outbreak of Cholera, and the rest by the Artillery. In the Infantry Barracks, the average number of men in each building was 35, and in several cases it was as much as 40. Even with these increased numbers the apparent allowance of cubic space to each man was sufficient, but any addition to the proper complement is objectionable, because it involves the necessity of occupying the inner verandahs as sleeping rooms. This leaves the men no separate rooms for meals, and interferes with the ventilation of the buildings. The barracks occupied by the Artillery were not overcrowded.*

The latrines are constructed on the ordinary surface principle. They are built in a single line to the south of the barracks. The wash-houses and urinaries, 14 in number, are built together in rows, between every second line of barracks. Six of these drained into cess-pools, 25 feet deep, with a tube from each, rising to a height of 10 or 12 feet. The stench from them was often very bad, and these cess-pools ought clearly to be abolished, as they should be everywhere else. The remaining eight urinaries, which have been more lately constructed, do not drain into cess-pools, the refuse water being removed daily in iron tubs.

The barracks in the Cavalry lines are large buildings, on the ordinary plan. Each building consists of one large room, 210 feet long, with inner and outer verandahs, and smaller rooms for the Sergeants. Ninety-two men can be accommodated in each building, and with this number there is an allowance per man of about 1,400 cubic feet. The actual number of men in each barrack during the Epidemic was considerably less in every case than the authorized number. The latrines and urinaries are similar to those in the Infantry and Artillery lines. Three of the urinaries drain into cess-pools.

A portion of the Royal Artillery occupied barracks on the extreme right of the European lines. There are two large buildings, each intended for 72 men. They were not over-crowded.

Three other temporary barracks, near the Rum Godown, were occupied by the Royal Artillery. These buildings are spacious and airy, and afford better accommodation for Troops than is found in many barracks of a far more expensive character. Each barrack contains inside a space 230 feet long, 51 feet broad, and 23 feet high. The roof is supported on either side by a row of arches, each 12 feet span, with three feet piers, and the interior of the barrack is thus little encumbered with walls to interfere with proper ventilation. The barrack is divided into three compartments, communicating with each other by means of arches, 12 feet span, and 18 feet high. There is an outer verandah, 9 feet broad, on each side of the building. One of these buildings is partitioned off for Married Quarters, and for Reading Rooms, Sergeants' Mess, &c.; and a portion is left unpaved for skittles and other games, so that there is space both for amusement and occupation within the barracks.

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* The barrack arrangements at Meerut in the Infantry and Artillery lines have been much approved by some Authorities, but they are in reality very unsatisfactory. The objectionable practice of placing a large number of men in one room is not avoided by adopting barracks of this construction. There can be little doubt that the contamination of the atmosphere and soil caused by this multitude of small barracks, latrines, urinaries, wash-houses, and cook-rooms scattered over a wide area, is much greater than it would be if the barracks were larger and fewer in number; while, in other respects, the present arrangements are very inconvenient.—J. S.

The hospital stands on the extreme east of the Artillery lines. It consists of two wings, with the dispensary in the middle. The south wing contains two wards, each 60 feet long, 24 feet broad, and 26 feet high. They communicate on both sides with inner verandahs, and outside these again there are open verandahs. Each ward is intended for 20 patients. The north wing of the hospital contains three wards, one of them 96 feet long, intended for 32 patients; and the others smaller, one for 16 and one for 12 patients. The allowance of space per man is about 1,700 cubic feet in each ward of the hospital, and about 72 superficial feet. None of the wards were crowded during the Epidemic. The ward for 16 patients was reserved for cases of Cholera. The latrine attached to the south wing is of better construction than usual. It stands at the south-east corner of the building, and is connected with it by a covered way. The latrine for the north wing of the hospital is of inferior construction. It stands on the east front of the large ward, and the back of the latrine faces the main building in such a manner that the effluvia must often be carried into the hospital.

The new Infantry Hospital consists of three wards. The main ward in the centre of the building is 102 feet long, and the smaller rooms are each 30 feet long. All of the wards are 24 feet broad, and 26 feet high, and there are double verandahs on both sides, according to the usual plan. Altogether this hospital is considered capable of accommodating 100 patients, allowing 1,790 cubic feet of space to each. The building contained on the outbreak of Cholera 62 patients, but the number rose at one time to 96, in consequence of the necessity of obtaining room elsewhere for the treatment of Cholera cases. The latrine is at the south-west corner, connected with the hospital by a covered way. The west front of this hospital is blocked up in an objectionable manner by the wall which encloses it, and by the latrine, urinary, and wash-house.

The old Infantry Hospital consists of a long thatched building, divided into two wards, one of them 90 feet long, and the other 50 feet. Each of them is 24 feet broad and 20 feet high, and there are double verandahs on both sides. The smaller ward was used as a Cholera ward for the 35th Regiment. The large ward was occupied at the commencement of the Epidemic by 34 patients under treatment for syphilis. This ward is intended for 36 patients, which gives to each an allowance of about 1,200 cubic feet of space.

The hospital of the Royal Horse Artillery forms a continuation of the same range of building, and it contains two wards similarly constructed. It was never at all crowded.

The Female Hospital is a detached building of similar construction in the same line, with accommodation for 24 patients. The actual number of sick was at no time during the Epidemic so large as this. The east front of these hospitals is much obstructed with walls, latrines, and other buildings.

The Cavalry Hospital consists of two wards, each 97 feet long, 25 broad, and 22 high, communicating with double verandahs. There are two smaller wards at each end. This hospital can accommodate altogether 100 patients. The actual number in the building during the Epidemic was always much below this. The latrines are at the south-east and north-east corners, and connected with the hospital by covered passages.

The supply of water at Meerut appears to be sufficient, and the quality of the water is said to be good. The number of cess-pools situated at no great distance from the wells is, however, so considerable, that the contamination of the water by them in some places appears by no means impossible. These cess-pools must for this, as for many other reasons, be considered very objectionable, and they ought to be completely done away with.

No particular remarks are required, in addition to what has been already stated, regarding the system of conservancy followed at Meerut. The ordinary plans are in force for the daily removal of filth.

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The following Table shows the strength of the European Troops stationed at Meerut on the outbreak of Cholera, with the number of cases and deaths that occurred among them :—

REGIMENT.	STRENGTH.			CASES OF CHOLERA.						PERCENTAGE.								
				Men.		Women.		Children.		Cases to Strength.			Deaths to Strength.			Deaths to Cases.		
	Men.	Women.	Children.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Men.	Women.	Children.	Men.	Women.	Children.	Men.	Women.	Children.
Bengal Artillery Division	618	79	113	41	27	2	1	5	5	6·6	2·5	4·4	4·4	1·2	4·4	65·9	50·0	100·0
Royal Artillery ...	360	8	7	4	4	1	1	...	...	1·1	12·5	...	1·1	12·5	...	100·0	100·0	...
H. M.'s 8th Hussars ...	661	32	42	40	29	2	2	4	3	6·1	6·2	9·5	4·4	6·2	7·1	72·5	100·0	75·0
H. M.'s 35th Regiment ...	1,112	81	112	32	26	5	4	5	5	2·9	6·2	4·5	2·3	4·9	4·5	81·2	80·0	100·0
Total ...	2,751	200	274	117	86	10	8	14	13	4·3	5·0	5·1	3·1	4·0	4·7	73·5	80·0	92·8

The following Table gives similar details for the men of the Native Regiment stationed at Meerut :—

REGIMENT.	Strength.	CASES OF CHOLERA.		PERCENTAGE.		
		Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.
23rd Regiment N. I.	623	4	2	0·6	0·3	50·0

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Among the European inhabitants of Meerut the first case of Cholera occurred on the 30th June. On this day a child was attacked in a house near the Cavalry lines.

On the 6th July, a man in the 8th Hussars was attacked and died. This case was recorded as one of Choleraic diarrhœa. On the 8th July, there was a case of undoubted Cholera among the men of the same Regiment.

Her Majesty's 8th Hussars arrived in Meerut from Nuseerabad in February 1861. They had been stationed at Nuseerabad for eighteen months, and the health of the Regiment had been generally good. Previously to the outbreak of Cholera the health of the men at Meerut had been very satisfactory. There was no prevalence of diarrhœa, and excepting syphilitic diseases, and other affections of similar character, there had been little sickness.

There was nothing that could be discovered in the duties of the men or in their mode of life likely to make them in any way specially liable to disease. The amount of duty was moderate, and there was no exposure to heat or damp.

After the 8th July, cases of Cholera continued to occur nearly every day until the end of the month. The largest number of admissions on one day was seven, on the 28th July. With the exception of this day, there was little variation during July in the virulence of the disease. Although the number of cases in this Regiment was large, amounting to 40, of which 29 were fatal, there are few circumstances which appear to demand special notice. With the exception of one barrack, in which there were 10 cases, the difference in the liability to attack was not very great in the various buildings. No barrack escaped altogether.

Among the patients in hospital with other diseases there was only one case of Cholera. This was a man suffering from chronic hepatitis.

This hospital has the advantage of a better position and a more sandy soil than the other hospitals of the station. There are no other apparent reasons why the patients in it should have suffered less severely than they did elsewhere. The average daily number of sick, not including cases of Cholera, was 45. The hospital was thus never crowded. All Cholera patients were treated in a separate ward. The general management of the hospital appears to have been very good, and care was taken to maintain it in a good sanitary condition. Hospital orderlies were told off according to the usual custom, but they were relieved every six hours, and were not subjected to much fatigue. No cases of Cholera are reported to have occurred among them, nor among any of the regular Hospital Establishment. Medicines were given to the Sergeants for distribution in barracks, and endeavours were made to detect the pre-

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monitory symptoms of disease. It is, however, stated that in this Regiment cases of Cholera were not often preceded by diarrhœa.

The last case occurred on the 7th August. On this day the men were moved into tents, pitched close to the barracks, and the barracks were vacated for the purpose of being white-washed and purified. After this there were no more cases of Cholera. Although the admissions had not been numerous during the preceding week, there having been five in all, there can be little doubt that the removal from the barracks caused the cessation of the disease. This is the more probable when we consider that Cholera continued in the Infantry and Artillery lines for some time longer.

The 35th Regiment arrived from England in the year 1855. In December 1859 it reached Meerut. The health of the men had generally been very good, and before the outbreak of the late Epidemic there was no prevalence of any disease. The men were recruited from a good class, and were generally strong and healthy. In every matter connected with their management, whether we refer to their duties, amusements, or general habits of life, the measures that were adopted were likely to be beneficial to their health, and to render them as little predisposed as possible to the attacks of epidemic disease.

The first man attacked with Cholera in the Regiment was a patient in hospital, under treatment for syphilis. He was seized early on the 11th July, and the case proved fatal. As soon as Dr. Chambers saw him, the patient was removed to a separate ward, and in about an hour afterwards the man in the next bed, who was also under treatment for syphilis, was attacked by Cholera. After this there were no more cases until the 15th July, when a man was seized with Cholera in the hospital, where he was in attendance on his sick wife and children. On the 17th July there were two more cases in the hospital. One was a man who was employed as Clerk, and who lived in the hospital enclosure. The other was a patient suffering from syphilis, who occupied a bed next to the beds of the two men who had previously been attacked in the same room. On the 19th July the first case was admitted from the barracks. On the 20th July a man under treatment for hepatitis was attacked in another part of the hospital. On the 24th and 25th July, there were three admissions from the barracks. On the 25th another man was attacked in the hospital. He was attending, in accordance with his own request, a comrade who was ill with Cholera. On the 27th July a case occurred in the barracks; there was another on the 29th; another on the 31st; and another on the 1st August. On the 7th August a man in hospital, under treatment for diarrhœa, was attacked with Cholera. On the 8th there was a case in barracks, and on the 10th

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two more. On the 11th August a man was attacked in hospital. He had lately recovered from diarrhœa, and although weak, appeared quite well. On the same day a case was admitted from the barracks, and on the following day another. On the 13th August a patient in hospital, under treatment for diarrhœa, was attacked. On the 13th, 14th, and 15th, three more cases came from the barracks; and on the 15th August, the last case occurred in the hospital, where a patient under treatment for syphilis was attacked with Cholera. He was in a different ward to that in which the other cases had occurred.

Thus there were altogether 32 cases and 26 deaths from Cholera. These were distributed as follows:—

	Cases.	Deaths.
Admitted from barracks	20	16
" " patients in hospital with other diseases	9	7
" " men employed on hospital-duty ...	3	3

The average healthy strength per diem during the Epidemic was 990, and the average number of patients in hospital, with other diseases than Cholera, was 117. Thus, while among the healthy strength in barracks, only 2 per cent. were attacked with Cholera, and 1·6 per cent. died, no less than 7·7 per cent. of the patients in hospital, with other diseases, were attacked, and 6 per cent. died. Of the cases admitted from barracks, 80 per cent. proved fatal, and of those among the hospital patients, 77·8 per cent. Altogether 37·5 per cent. of the whole number of cases among the men of this Regiment apparently had their origin in the hospital. Similar facts are observable in regard to the cases of Cholera among the women. Three of the five cases occurred in the hospital. In one of these, a patient was attacked while under treatment for dysentery. The second case was the hospital matron, who had lately been in attendance upon two Cholera patients, and the third was the wife of the Hospital Sergeant. Five children were seized with Cholera in the barracks, and all died.

The following Table shows the number of cases of Cholera which occurred in each of the buildings occupied by the 35th Regiment.

We have here a good example of the manner in which Cholera establishes itself in particular localities, leaving others close by free from attack. This well-known and very common character of an Epidemic of Cholera was equally marked in the Artillery lines. Thirteen of the Infantry Barracks escaped the disease altogether, and in none of the rest did it become very prevalent.

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Description and No. of Building.	No. of persons occupying Building on outbreak of Cholera.	Cases of Cholera in each Building.
Barrack 21	41	3
„ 22	36	1
„ 23	39	2
„ 24	40	1
„ 25	42	1
„ 26	34	...
„ 27	36	...
„ 28	35	1
„ 29	37	...
„ 30	34	...
„ 31	36	...
„ 32	40	...
„ 33	35	...
„ 34	34	2
„ 35	32	...
„ 36	40	2
„ 37	44	...
„ 38	39	1
„ 39	34	1
„ 40	40	2
„ 41	35	2
„ 42	36	...
„ 43	36	...
„ 44	36	...
„ 45	35	...
„ 46	34	2
„ 47	33	...
„ 48	41	1
„ 49	35	1
„ 50	40	1
„ C	19	1
„ D	34	..
Mess Waiters' Quarters	3	1
Provost Sergeant's do.	2	1
Hospital Sergeant's do.	5	2
New Hospital	70	5
Old do.	36	4
Female do.	32	3
Bungalow No. 100...	30	1

The arrangements made by Dr. Chambers for ensuring the treatment of every case of Cholera from the appearance of the first symptoms were excellent and successful. The fear of the hospital, of which we have so often spoken, produced in this Regiment no bad effects. Every man was ready to tell everything to the Surgeon, for he knew that there was no danger of being sent into the Cholera hospital, and that whether his ailments were serious or trifling, he would always be treated with kindness and consideration. Colonel Walter expressed to the Commission in strong terms his belief that the comparative escape of his Regiment from Cholera was, in a great measure, due to the attachment of the men to Dr. Chambers, and to the readiness and confidence with which they attended to all his recommendations. Medicines were given to the Color Sergeants of Companies for use in the barracks in case of sudden emergencies. Frequent inspections of the men were made, and in a large number of cases of slight diarrhœa, or other trifling complaints, medical treatment was afforded without obliging the men to remain in hospital. More serious cases of diarrhœa were treated in a separate ward, and these were very numerous. No less than 228 cases of diarrhœa were treated in hospital during July and August. In many of these there were symptoms which would almost certainly have passed into those of confirmed Cholera had they not been checked on their first appearance. Some of these cases, indeed, would doubtless have been recorded as Cholera by many Medical Officers, and in classing them as diarrhœa, Dr. Chambers has, perhaps, hardly done justice to his own treatment. No cases having been recorded by him as Cholera, except those regarding which there could be no sort of question; the percentage of deaths to cases is higher in this Regiment than in some others in which the treatment was in reality far less successful. All Cholera cases were, from the first, separated from those of other diseases. One ward was reserved for patients in the worst stage of the disease, and when there were symptoms of improvement, the patient was removed to another ward, separate from the rest of the hospital. Additional accommodation for the sick was provided, so that there might be no danger of overcrowding. One of the barracks near the hospital, capable of holding 50 patients, was taken for this purpose. On the 15th August the hospital buildings were cleared of all their inmates, and the patients were removed into five barracks that had been thoroughly purified. After this measure was adopted, there were no more cases of Cholera among the sick. Orderlies were supplied for attendance on men attacked with Cholera. A considerable number of these were volunteers, who were desirous of helping their sick comrades. Care was taken to employ the orderlies as little as possible inside the hospital, and to keep them on duty no longer than was absolutely necessary. Besides the cases already noticed, in which attendants on the sick were seized with Cholera, only one orderly was attacked. There were no cases of Cholera among the hospital subordinates, or among the Native Medical Establishments.

The disease reached its climax between the 7th and the 15th of August. On the morning of the 17th, a wing of the Regiment was moved into tents, to a distance of about one mile. The camp was formed in the station on the side of the Mall, as no dry ground for the tents could be found in any other situation. More room was thus afforded for the men who remained in barracks and in hospital. After this, not a single case of Cholera occurred in the Regiment; and although it is true that there were no admissions on the 16th August, the day before the camp was formed, there can be little doubt that the change was beneficial, and that the complete cessation of the disease must, in some measure at least, be attributed to it.

Many excellent measures have been carried out in this Regiment for promoting generally the physical and intellectual interests of the men; and it cannot be doubted that they produced important results during the presence of Cholera.

The management of the Regiment appears to have been in the highest degree creditable to Colonel Walter, to Dr. Chambers, and to the other Officers of the Regiment.

The health of the men of the Bengal Artillery, of which the Head Quarters are at Meerut, had been generally good before the outbreak of the Epidemic. A large number of Recruits were, however, attached to the depôt situated here, and their health had been generally very indifferent.

In the Bengal Artillery Division, the first man attacked was a patient in hospital, under treatment for a syphilitic affection. "This case,"—we quote from the Report of Dr. Banister, who was in medical charge of the Division,—"occurred on the 12th July. On the 14th a child in barracks was seized; on the 15th another child in an adjoining barrack. On the 19th the first case among the Troops in barracks occurred; on the 20th there were four more cases, and from the 24th to the 28th, 20 others were admitted. The Epidemic then abated in frequency, but still retained its virulence of power, for the last case which occurred on the 27th August was as malignant in character as any that had taken place."

The two following Tables have been prepared from Dr. Banister's Report. They show the distribution of cases of Cholera in the various buildings occupied by the Artillery, and with their help the daily progress of the disease can be traced.

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TABLE I.

No. of Case.	Place in which case occurred.	Date of attack.	Men.	Women.	Children.	Died.	Recovered.
1	Hospital ...	12th July...	1	...	...	1	...
2	Barrack B	14th ,, ...	...	...	1	1	...
3	,, A	15th ,, ...	...	...	1	1	...
4	,, 9	19th ,, ...	1	...	...	..	1
5	,, 2	20th ,, ...	1	...	...	1	...
6	,, 2	,, ,, ...	1	...	...	...	...
7	,, B	,, ,, ...	..	1	...	1	...
8	,, B	,, ,, ...	...	...	1	1	...
9	,, 10	21st ,, ...	...	...	1	1	...
10	,, 7	22nd ,, ...	1	...	...	...	1
11	,, 7	,, ,, ...	1	...	...	1	...
12	,, 18	24th ,, ...	1	...	...	..	1
13	,, 15	,, ,, ...	1	...	...	1	...
14	Hospital ...	,, ,, ...	1	...	...	...	1
15	Barrack 15	,, ,, ...	1	...	..	...	1
16	,, 14	25th ,, ...	1	...	...	1	...
17	,, 18	,, ,, ...	1	...	...	1	...
18	,, 9	,, ,, ...	1	...	...	1	...
19	,, 9	26th ,, ..	1	...	...	1	...
20	,, 13	,, ,, ...	1	...	...	1	...
21	,, 9	,, ,, ...	1	...	...	1	...
22	,, 3	,, ,, ...	1	...	...	1	...
23	,, 7	,, ,, ...	1	...	...	..	1
24	Mess House	27th ,, ...	1	...	...	1	...
25	Barrack 14	,, ,, ...	1	...	...	...	1
26	Provt. Sergt.s' Guard Room	,, ,, ...	1	...	...	1	...
27	Hospital ...	,, ,, ...	1	...	...	...	1
28	Barrack 8	,, ,, ...	1	...	...	1	...
29	,, 10	,, ,, ...	...	1	...	...	1
30	,, 9	28th ,, ...	1	...	...	1	...
31	,, 8	,, ,, ...	1	...	...	1	...
32	Hospital ...	29th ,, ...	1	...	...	..	1
33	,, ...	30th ,, ...	1	...	...	1	...
34	Barrack 9	31st ,, ...	1	...	...	...	1
35	,, 15	2nd August	1	...	...	...	1
36	Hospital ...	,, ,, ...	1	...	...	1	...
37	Barrack 15	7th ,, ...	1	...	...	1	...
38	Hospital ...	11th ,, ...	1	...	...	1	...
39	Tent ...	,, ,, ...	1	...	...	1	...
40	Hospital ..	17th ,, ...	...	...	1	1	...
41	,, ...	19th ,, ...	1	...	...	..	1
42	,, ...	,, ,, ...	1	...	...	1	...
43	,, ...	,, ,, ...	1	...	...	1	...
44	,, ..	,, ,, ...	1	...	..	1	...
45	,, ...	,, ,, ...	1	...	...	...	1
46	,, ...	24th ,, ...	1	...	...	1	...
47	Barrack A	27th ,, ...	1	...	...	1	...
48	Hospital ..	10th October	1	...	...	1	...

TABLE II.

Description and No. of Building.	No. of persons occupying Building on outbreak of Cholera.	Cases of Cholera in each Building.				Each Building how occupied.
		Men.	Women.	Children.	Total.	
Barrack A	33	1	...	1	2	Married Quarters.
,, B	34	..	1	2	3	Ditto.
,, 1	29	...	...	...	...	4th Troop, 1st Brigade, H. A.
,, 2	29	2	...	...	2	5th ditto ditto.
,, 3	28	1	...	...	1	Recruit Depôt.
,, 4	32	...	...	...	...	Ditto.
,, 5	38	...	...	...	...	Married Quarters.
,, 6	30	...	...	...	...	4th Troop, 1st Brigade, H. A.
,, 7	29	3	...	...	3	5th ditto ditto.
,, 8	33	2	...	...	2	Recruit Depôt.
,, 9	27	6	...	...	6	Ditto.
,, 10	38	...	1	1	2	Married Quarters.
,, 11	...	...	...	...	...	Sergeants' Mess and Library.
,, 12	29	...	...	...	...	5th Troop, 1st Brigade, H. A.
,, 13	32	1	...	...	1	Recruit Depôt.
,, 14	28	2	...	...	2	4th Company, 4th Battalion.
,, 15	31	4	...	...	4	Band.
,, 16	29	...	...	...	...	4th Troop, 1st Brigade, H. A.
,, 17	33	...	...	...	...	Recruit Depôt.
,, 18	27	2	...	...	2	4th Company, 4th Battalion.
,, 19	29	...	..	...	...	Ditto ditto.
,, 20	7	...	...	...	..	Sergeant Major, &c.
Tent	...	1	...	...	1	
Provt. Sergt.'s Guard Room	3	1	...	...	1	
Mess House	5	1	...	...	1	
Hospital	71	14	..	1	15	

In ten out of the twenty-three buildings, there were no cases of Cholera at all. The three barracks on the north, Nos. 1, 6, and 16, adjoining the Parade Ground, none of which were attacked, were occupied by the men of the 4th Troop, 1st Brigade, H. A. This Troop, which was 115 strong, entirely escaped during the Epidemic. There was nothing discoverable in the character of the men composing this Troop, or in any circumstances connected with them, which seemed at all to account for the manner in which they escaped, while other men of the same Regiment, placed under apparently similar circumstances, were attacked. In the 5th Troop, 1st Brigade, 105 strong, there were 6 cases of Cholera. Most of the men of this Troop lived in barracks Nos. 2, 7, and 12. In the 4th Company, 4th Battalion, 110 strong, most of them

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occupying barracks Nos. 14, 18, and 19, there were 6 cases. Among the Band, 42 strong, most of whom occupied barrack No. 15, there were 5 cases of Cholera. The Recruit Depôt, 221 strong, suffered more severely than any other part of the Force. Dr. Banister remarks that "it is not to be wondered at that this class should have suffered most, for many of them were growing lads with unsettled constitutions, battling for the first time against the heat and depression of a tropical summer, and all had suffered, in a greater or less degree, in April, May, and June, from Bowel complaints and continued fever." It appears, however, from the foregoing Tables, that except in one barrack, No. 9, and in the hospital, the Recruits did not suffer severely. In No. 9 barrack there were 6 cases of Cholera, but in Nos. 3, 8, and 13, there were only 4 cases, and in barracks Nos. 4 and 17, there were no cases at all. It was especially in the hospital that the Recruits were attacked so virulently; among them, while under treatment for other diseases, there were 12 cases of Cholera.

If the pernicious influence of the hospital had been absent, the Artillery at Meerut would have escaped with comparatively little loss. From the 12th to the 13th July, there were 28 cases of Cholera among the men, of which 5 occurred in the hospital among the patients under treatment for other diseases. From the 1st August, until the cessation of Cholera, there were 13 more cases, of which 9 occurred in the hospital. On one day, the 19th August, there were no less than 5 cases. Altogether, out of 41 men attacked, 14, or 34·2 per cent. of the whole number, were patients in hospital. The average daily healthy strength during the prevalence of the Epidemic was 526, and the average number of patients in hospital with other diseases than Cholera was 89. In the former case, the percentage of attacks to strength was 5·1, while in the latter it was 15·7. The diseases from which the hospital patients were suffering when they were attacked by Cholera were the following:—asthenia 1, diarrhœa 7, fever 4, onychia 1, syphilis 1.

Two men who were attending on Cholera cases were attacked. Dr. Banister states that "out of 149 Natives engaged in and about the hospital, only 2 were attacked; one sweeper who recovered, and one punkah cooly who died."

In the south wing of the hospital, which contained about 40 patients, there were no cases of Cholera. All the cases occurred in the north wing; this, as we have already stated, contains three wards, one of which was reserved during the Epidemic for Cholera cases.

In the administration of the hospital there was certainly nothing to account for the liability of the patients to attack. Dr. Banister's

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superintendence was energetic and judicious, and everything possible appears to have been done to maintain the hospital in a proper state.*

On the 10th October, nearly six weeks after the disease had apparently ceased among the European Troops, a man was attacked with Cholera in the hospital and died in a few hours. He was in attendance on his wife, who was ill with diarrhœa. Although there had been no Cholera among the Soldiers for so considerable a period, the Epidemic had not at this time disappeared from the city.

In consequence of the flooded condition of the surrounding country, and the difficulty of finding ground for tents, it was considered impracticable to move the Artillery into camp. Towards the close of the Epidemic, about 80 men were sent to the Bungalows of the Clothing Agency, in a distant part of the station, and 100 men were placed in tents pitched near the Cavalry lines. The hospital was then vacated and purified. Dr. Banister considered that these changes were certainly beneficial.

The Royal Artillery consisted of the 5th Battery, 11th Brigade, strength 170 men, and the F. Battery, 1st Brigade, strength 190 men. The men belonging to the first of these Batteries were quartered in the barracks on the extreme right of the Bengal Artillery lines, while the other Battery occupied the barracks near the rum godown. No cases of Cholera occurred in any of these barracks of the Royal Artillery, but the hospitals, situated, as before noticed, in the Infantry lines, did not escape. In the 5th Battery, 11th Brigade, one patient, and in the Foot Battery, three patients in hospital were attacked with Cholera, and all died. The first case occurred on the 14th July, and the others on the 17th and 29th July, and on the 1st and 6th August. One woman was attacked in the quarters of the married people, and died.

The arrangements at Meerut during the prevalence of Cholera, in everything that concerned the men in Cantonments, were generally very judicious. But it is to be regretted that the Troops were not removed from the station at an early stage of the Epidemic, and that they were exposed for so long a time to the dangerous influences which were

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* Dr. Banister's Report contains the following account of a case that occurred in the Artillery Hospital. It serves to illustrate the effect that may be produced upon patients by witnessing the terrible symptoms of Cholera in others. " A fine healthy man, aged " 27, was admitted at 8 A. M. on the 28th July with bilious vomiting and purging. In a " few hours the stools were Choleraic, and he fell into a state of partial collapse. During " the afternoon, re-action was slowly established, and he fell into a refreshing sleep. On " waking up he passed a small quantity of urine, the first since his admission, expressed " himself much relieved, and again went off to sleep. At 10½ P. M. he was awoke by the " shrieks of another patient. In a fearful state of terror and agitation, and under the " influence of intense fright, he became wildly delirious; during his struggles to escape " from the ward, he was seized with general convulsions, and died at 11 A. M."

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evidently affecting many of the barracks and hospitals. That these influences were not more fatal than they actually were, may be reasonably attributed to the careful supervision of the Medical Officers.

In every other station that we visited the immunity of the European Officers was remarkable. This does not hold good at Meerut. The following Table will show that in the Artillery Division, and in Her Majesty's 8th Hussars, the Officers suffered more in proportion to their numbers than the men. No Medical Officers were attacked.

REGIMENT.	No. of Officers.	Cases of Cholera.	Deaths.	PERCENTAGE.		
				Cases to Strength.	Deaths to Strength.	Deaths to Cases.
Artillery Division ...	35	3	2	8·6	5·7	66·6
H. M.'s 8th Hussars ...	20	3	2	15·0	10·0	66·6

In the Royal Artillery, and in Her Majesty's 35th Regiment, no Officers were attacked.

There were five other fatal cases of Cholera among the European residents of Meerut. Dr. McClelland has given the following details regarding these cases :—

"The cases of Officers and their families attacked at Meerut were chiefly confined to certain localities, which always suffer from Epidemics, when other parts of the station are free from the disease. During the Epidemic of 1845, General Considine died in the house No. 41, in the left rear of the Infantry lines, now occupied as the Mess-house of the Royal Artillery. In the recent Epidemic of 1861, a young lady died in No. 40, and two cases were attended by the Civil Surgeon in adjoining houses in that same locality, while a prisoner was attacked in that end of the cells of Her Majesty's 35th Regiment adjacent to the same house. The situation is low, and a large tank in the neighbourhood receives the drainage from the cook-houses of the barracks and hospitals of Her Majesty's 35th Regiment, conducted into it by pucka drains. The houses in which three Officers were attacked during the recent Epidemic are all in this locality, as well as that of the Mess Sergeant of the 8th Hussars, who occupied a small house in the Mess compound, having a wall within a few yards of the east front, against which a privy is placed within five yards of the open door, opposite to which the Sergeant lay when he was seized with fatal

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symptoms. An open drain passes from this and another privy close to the threshold of the door.

"A second bad locality is in the rear of the Artillery lines, near the house No. 15, where there was a marshy tank in 1856. The servants in the house No. 15 suffered much on that occasion, as well as the people in the adjacent Artillery Bazar; and a lady died in No. 4. The tank has since then been filled up, and the neighbourhood improved; yet an Officer died in No. 7, and a servant was attacked in No. 8 during the recent outbreak, while, on the same occasion, another Officer died in an adjoining house. Within 40 yards of the end of the last mentioned house there was an old tank in process of being filled up with stable litter.

"There are two lines of drainage at Meerut, one of which divides the European from the Native lines; it originates in broken ground about a quarter of a mile to the west of the Cavalry Barracks, where the filth of that portion of the lines is thrown, as well as dead carcasses. This drain falls to the south-east, where it joins another branch, which takes its rise about two miles from the first, on the left of the Native lines, which have therefore the advantage of natural drainage on both flanks, while the European lines have it only on one.

"The remaining cases of Cholera which occurred amongst the Officers and private residents took place in houses situated along those lines of drainage. A merchant was attacked in house No. 78, in the Epidemic of 1856: he then recovered, and was attacked again in the same house during the recent outbreak and died. In a house lower down, along the course of the nullah, a lady was attacked in the recent Epidemic. In the next house, the Judge's Cutcherry, an Officer was attacked on the same occasion. This house, one of the best at Meerut, stands in an open park. The soil is clayey, and the surface is hollow and low around the house. The park is surrounded on three sides by drains, the two main branches of which join here. On the night of the 26th of July there was an unusually heavy fall of rain, and from the obstruction of the drains in the lower part of their course, they overflowed their banks, and entered the low ground about the house, from which the water could not flow back again to the drains. The Officer was seized on the 27th July. In a small house next to that in which the last case occurred, five young Officers resided. One of these was seized on the 27th July, and another on the 1st August. The other three labouring under diarrhœa left the house, and soon recovered. The Mess Sergeant of the Artillery, who resided in the next house but one to that occupied by the young Officers in question,

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died about the same time. These last cases were not due to faults in the drains alone. The house occupied by the Officers was overcrowded. Besides the five Officers, their servants, probably amounting to 35 in number, mostly lived in the compound; they had also five or six horses in stables only ten yards from the front of the house. There was also a very bad privy in a corner of the small enclosure surrounding the house, to which the servants as well as Natives from without went; and in the opposite corner of the enclosure a trade in the conversion of cow-dung into fuel was carried on; several tons of the material were collected here daily to be made up into cakes and baked in the sun. Heavy rain would naturally interfere with the progress of this operation, and cause exhalation from the saturated mass of manure spread out to dry within thirty yards of the south-east corner of the house in which the gentlemen in question were taken ill.*

"The line of drainage divides the sandy surface of the Native lines from the clayey soil of the European lines. On the side of the Native lines, although occupied by Bazars and Officers' Bungalows, no case of Cholera occurred. Dr. Wilkie, Deputy Inspector-General of Hospitals, considers this part of the station to be less liable to the disease than the European lines, which may be considered to be entirely due to the protection it derives from the dry layer of sandy soil which overlies the clay. It has been observed at Meerut that those parts where this dry sandy soil is wanting, and the surface is composed of a bare sterile clay, have suffered most severely in the late, as they always have done in every preceding Epidemic."

ROHILKHUND.

The Province of Rohilkhund is separated from the Meerut Division by the Ganges, and lies between that river and the mountains of the Kumaon Himalaya. It comprises the Districts of Bijnore, Moradabad, Bareilly, Budaon, and Shahjehanpoor. It covers more than 12,000 square miles, and contains more than five millions of inhabitants.†

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* Dr. Banister says in his Report, remarking upon the bad sanitary condition of this house, that "three of these Officers were laid up with fever in May, and I strongly urged them to leave the place; but as they were unable to obtain shelter elsewhere, they were obliged to reside there."

† District.	Area in square miles.	Population.	District.	Area in square miles.	Population.
Bijnore ...	1,900	695,000	Bareilly ...	3,119	1,378,000
Moradabad ...	2,698	1,138,000	Budaon ...	2,401	1,019,000
			Shahjehanpoor ...	2,308	986,000

Rohilkhund, in consequence of its vicinity to the mountains, and the comparative abundance of water, enjoys a cooler and moister climate than the country between the Ganges and the Jumna. Trees are more abundant, and the vegetation generally is far more luxuriant. This Province has not been exempted from attack in former Epidemics of Cholera, but it is believed that they have seldom been virulent.

The only places occupied by European Troops are the stations of Moradabad, Bareilly, and Shahjehanpoor. Before the mutinies of 1857, there were no European Troops in the Province, and so far as this short experience enables a judgment to be formed, the Rohilkhund stations promise to be among the healthiest in Northern India. The Troops suffered very slightly from the late Epidemic, nor, for the most part, was the disease virulent among the Native population.

BIJNORE.

The District of Bijnore forms the most northerly portion of Rohilkhund. Cholera attacked the town of Bijnore on the 25th July, reached its climax early in August, and did not disappear until the end of September. Ninety-one deaths were reported among a population of about 12,000. There were five cases in the Jail, and a few among the Police. Regarding the total mortality in the District no information could be obtained. The Epidemic appears to have attacked nearly every part of the District, but it was no where very fatal.

MORADABAD.

The District of Moradabad lies to the south of Bijnore. Cholera is said to have first appeared early in July, in the Sumbhul Sub-Division, which is situated in the south of the District. It continued here until the end of August, and 709 deaths are reported to have occurred among a total population of 214,000. In the adjoining Sub-Division of Billaree, on the east, containing 188,000 inhabitants, there are said to have been 450 deaths between the 16th August and the middle of September. Early in August, Cholera appeared at Moradabad, and in the city and its neighbourhood there are said to have been 200 deaths until the cessation of the disease early in October. At Amroha, a large town with 35,000 inhabitants, 20 miles to the north-west of Moradabad, Cholera appeared and ceased about the same time as at Moradabad, and 75 fatal cases are said to have occurred there. In the Sub-Division of Hussunpoor, bordering on the Ganges, and containing 156,000 inhabitants,

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there were 136 deaths from Cholera; the disease appeared in the middle of August, and ceased towards the end of September. In Kasheepoor and Thakoordwara, the portions of the District lying near the mountains, Cholera is said not to have appeared until the beginning of September, and to have ceased about the 19th October, after proving fatal to 110 persons. Altogether in the District 1,680 deaths were reported to have occurred. Althougth no confidence can be placed in these figures, they serve to indicate the fact that the disease was no where very virulent.

There was no Cholera in the Jail. The 30th Regiment N. I., strength 345 men, which was quartered at Moradabad, also entirely escaped.

The station, which is situated close to the city of Moradabad, was occupied during the Epidemic by the Left Wing of Her Majesty's 88th Regiment. The Table over-leaf shows the strength of the Wing, and the cases of Cholera that occurred:—

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REGIMENT.	STRENGTH.			CASES OF CHOLERA.						PERCENTAGE.								
				Men.		Women.		Children.		Cases to Strength.			Deaths to Strength.			Deaths to Cases.		
	Men.	Women.	Children.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Men.	Women.	Children.	Men.	Women.	Children.	Men.	Women.	Children.
Left Wing H. M's. 88th Regiment	465	27	27	2	2	1	1	1	1	0·4	3·7	3·7	0·4	3·7	3·7	100·0	100·0	100·0

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The first case of Cholera among the Soldiers occurred on the 2nd August. On this day a patient in hospital, who was under treatment for fever, was attacked with Cholera. On the 3rd August a child was seized; on the 5th a woman; and on the 14th August a man. These three last cases occurred in the Married Quarters. After the 14th August the disease ceased. Every case proved fatal. There was no Cholera among the Hospital Establishments. No Officers were attacked.

BAREILLY.

We have little information regarding the mortality from Cholera in the District of Bareilly. The Epidemic seems to have been widely diffused, but to have been no where virulent. It is said to have first appeared in the city of Bareilly on the 5th July. It reached its height in the middle of August, and disappeared about the end of September. One hundred and twelve persons are said to have died in the city. The population exceeds 100,000.

On the 12th August Cholera appeared in the Central Prison at Bareilly, which at this time contained about 1,400 prisoners. The first case, writes Dr. Cuningham, the Superintendent of the Prison, occurred on the 12th August. "On that day three prisoners were attacked; on the 21st three more were admitted; on the 22nd one; on the 23rd one; on the 25th two; on the 26th one. On the 26th September, one month afterwards, one more case occurred; there were thus in all only twelve admissions; of these, four were miserable objects already in hospital, suffering from severe disease, and all died. Only one man in even average health fell a victim to the Cholera. The remainder recovered."

The Native Troops at Bareilly consisted of the 10th Bengal Cavalry, strength 234 men, and the 21st Regiment N. I., strength 518 men. There were no cases of Cholera among them.

The following Table shows the strength of the European Troops at Bareilly, and the cases of Cholera that occurred among them :—

REGIMENT.	STRENGTH.			CASES OF CHOLERA.						PERCENTAGE.								
				Men.		Women.		Children.		Cases to Strength.			Deaths to Strength.			Deaths to Cases.		
	Men.	Women.	Children.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Men.	Women.	Children.	Men.	Women.	Children.	Men.	Women.	Children.
3rd Battalion Rifle Brigade	992	33	39	6	5	...	...	...	...	0·6	...	...	0·5	...	...	83·3	...	...
Royal Artillery, 8th Battery, 11th Brigade ...	174	8	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Total ...	1,166	41	43	6	5	...	...	...	...	0·5	...	...	0·4	...	...	83·3	...	...

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On the 23rd August three patients in the hospital of the 3rd Battalion Rifle Brigade were attacked with Cholera and all died. One of these men was suffering from syphilis, one from general debility, and one from ulcer in the leg. On the 8th September a man was admitted with Cholera from the barracks. On the 9th September another case occurred in the barracks, and on the 24th September another; the last case was the only one that did not prove fatal.

The average daily healthy strength of the Regiment during the Epidemic was 900 men, and the average number of patients in hospital with other diseases was 90. The percentage of cases to healthy strength was therefore 0·3, and of deaths 0·2; while among the patients in hospital the percentage of cases to strength was 3·3, and of deaths to strength 3·3.

The Artillery escaped entirely. No Officers were attacked with Cholera at Bareilly.

BUDAON.

Very little information could be obtained regarding the mortality from Cholera in this District, which lies to the south of Moradabad and Bareilly. The disease appears to have been common in August and September, but to have been no where very fatal. In the city of Budaon, containing 28,000 inhabitants, 218 cases of Cholera and 65 deaths are reported to have occurred between the 12th August and 8th September.

There were no cases of Cholera in the Jail.

SHAHJEHANPOOR.

This District lies to the east of Bareilly and Budaon, and borders on the Province of Oudh. The Head Quarters and Right Wing of Her Majesty's 88th Regiment were quartered at the station of Shahjehanpoor, close to the city of the same name.

No cases of Cholera occurred among the European Troops, and it is stated that the disease did not assume an epidemic form in any part of this District.

MUTTRA.

The District of Muttra, in the division of Agra, lies to the south and east of Allygurh, on both sides of the Ganges. Cholera had become prevalent in the western parts of the District towards the end of May. There is no authentic information regarding the actual amount of the mortality, but it was probably not very great. In the beginning of June, Cholera appeared in the city of Muttra, and in the Poor-house that was established there. On the 14th July the first case occurred in the Cantonment Bazar.

The following Table shows the strength of the European Troops at Muttra on the outbreak of Cholera, and the number of cases and deaths that occurred:—

REGIMENT.	STRENGTH.			CASES OF CHOLERA.						PERCENTAGE.								
				Men.		Women.		Children.		Cases to Strength.			Deaths to Strength.			Deaths to Cases.		
	Men.	Women.	Children.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Men.	Women.	Children.	Men.	Women.	Children.	Men.	Women.	Children.
Royal Horse Artillery, 3rd Troop, 3rd Brigade ...	106	5	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
H. M.'s 20th Hussars ..	245	21	31	18	4	2	...	2	...	7·3	9·5	6·4	1·6	...	...	22·2	...	...
Total ..	351	26	37	18	4	2	...	2	...	5·1	7·7	5·4	1·1	...	...	22·2	...	...

The accommodation provided for the Troops at Muttra was very indifferent. The Cavalry occupied three large barracks, badly built and inconveniently arranged. One of them was intended for 104 men, and each of the others for 96 men. One of the buildings were occupied by the full number that they were considered capable of holding, and there was no deficiency in the space allowed for each man. The hospital is a new building, with accommodation for 48 patients. The actual number of sick during the Epidemic was seldom more than 30, and the hospital was never crowded.

The conservancy arrangements were extremely unsatisfactory. The latrines, which were on the usual surface principle, were very bad, and there was a most objectionable system of cess-pools which received the refuse water from the latrines and cook-houses. These cess-pools were in a very offensive condition.

There are four barracks in which the greater portion of the Artillery were accommodated. Each of them is intended to hold 40 men. The buildings are inconvenient and badly constructed, but the men do not appear to have been crowded. The hospital contains room for 12 patients in the main wards, and other smaller wards are also available. The building was never crowded, and the allowance of space to each patient was sufficient. The latrines were, as usual, very objectionable.

The information regarding the circumstances under which the Epidemic attacked the 20th Hussars is very incomplete. The first case of Cholera occurred on the 16th July, and the last on the 9th August. Four of the cases occurred among patients in hospital with other diseases. The average daily healthy strength of the Regiment during the Epidemic was 215, and the average number of sick in hospital was 30. We have therefore the following comparative results :—

			PERCENTAGE.		
	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.
Admitted from healthy strength...	14	2	6·5	0·9	14·3
Ditto from Patients in hospital with other diseases.	4	2	13·3	6·6	50·0

This Table, however, does not fully represent the virulence of the disease in the hospital. In addition to the cases admitted from the patients, the Hospital Sergeant was attacked and died. The Hospital Steward and his son were also seized, but recovered. The hospital was never crowded, and the arrangements of the Surgeon, Dr. Cox, appear to have been very judicious. Great exertions were made by him and by Colonel Tucker to induce the men not to conceal the premonitory symptoms of disease, and arrangements based upon the system recommended by Dr. Murray at Agra, which will be noticed further on, were carried out very successfully for securing the treatment of every case from the earliest possible stage.

It will be observed that the percentage of deaths to cases was very much smaller than usual. In some degree this must probably be attributed to the judicious measures which have just been noticed. But there can be no doubt that many of the milder cases which have been recorded as Cholera would have been classed differently by some Medical Officers. It has been already observed that there is much diversity of practice in determining what symptoms shall be held to indicate a developed case of Cholera.

One Officer of the 20th Hussars was attacked with Cholera, but recovered.

There were no cases of Cholera among the Artillery.

During the Epidemic of Cholera which attacked Muttra in the previous year 1860, the same Troops were stationed there. They occupied the same quarters, and no sanitary or other changes of any importance appear to have been carried out between the twoa ttacks. The Artillery, which escaped in 1861, suffered in 1860 far more severely than the Cavalry. In 1860, out of a strength of 279 men, in Her Majesty's 20th Hussars, there were 31 cases of Cholera and 12 deaths, while in the Artillery, with a strength of 89 men, there were 19 cases and 12 deaths. No explanation of this fact can be given, and it is needless to attempt to account for it by considerations based upon any theory.

AGRA.

Cholera appears to have become prevalent in the Agra District early in June, but it was seldom very virulent. Regarding the actual progress of the disease, or the mortality that occurred, there is little information.

Dr. Murray states in his Report[*] that at the Kundowlee Famine Kitchen, 10 miles north of Agra, there were 23 deaths on the 13th June. This Kitchen was visited by Dr. Currie on the 14th June, and he himself died from Cholera on the following day. The disease disappeared from the Famine Kitchens in the District after the rains set in at the end of June. About the same time it became common in the city of Agra. There are no authentic returns to show even approximately the mortality that occurred. The number of deaths is stated to have been from 1,000 to 3,000 during June, July, and August. The population of the city of Agra, according to the last census, was 125,000.

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[*] Report on Epidemic of Cholera in Agra, &c., during 1861, page 3.

The first case of Cholera reported in the city was admitted into the Thomason Hospital on the 11th June, from the Famine Kitchen at Shahgunj in the suburbs. The average daily number of persons at this time receiving food, or employed on the works that were being carried on for the relief of the poor, was about 3,000, and among them there were 110 cases of Cholera and 58 deaths, between the 11th and 30th June. In July, 66 cases, of which 35 proved fatal, were admitted into the Thomason Hospital, and there were 26 cases and 15 deaths from the 1st to the 18th August, but we are not informed what was the average number of paupers during this time. The last case of Cholera treated in the Thomason Hospital was admitted on the 19th August.

There was a severe outbreak of Cholera in the Central Prison at Agra. This contained, on the 1st July, 2,960 prisoners. On that day a fatal case of Cholera occurred. There was another on the 4th, and on the 6th July there were seven fresh cases. As the disease continued to increase, there being on the 8th, 9th, and 10th July 49 admissions and 15 deaths, it was determined to move a portion of the prisoners into camp. On the 11th August, 800 men were sent into tents on the Pooya Ghât road to a distance of about three miles, and 150 men were sent to Secundra, 4 miles distant. Dr. Murray considers that the advantage gained by moving the prisoners was very decided. There were only four cases of Cholera among the Pooya Ghât party, and one at Secundra. After this removal, the disease diminished in the Jail also, and on the 18th July, the prisoners returned from camp. Cases continued, however, to occur almost every day until the beginning of August. The last case was on the 23rd August. Altogether there were 173 cases of Cholera among the prisoners, of which 63 were fatal. Dr. Walker, the Superintendent of the Prison, has noticed that the men who were sent into camp were all healthy, while a considerable proportion of those who remained at Agra were old and weak, and he considered that a fair comparison could therefore hardly be made between the liability to Cholera in the Prison and in the camp.

This Prison labors under the disadvantage of having been added to from time to time, instead of being constructed, as some of the newer Central Prisons have been, on a definite plan from the beginning. The arrangement of the buildings is therefore not always convenient or free from sanitary objection. The management, however, was excellent. The conservancy is upon the system ordinarily followed in the Central

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Prisons of the North-West Provinces. It was carefully attended to, and very successful.

Dr. Murray states in his Report "that in the Thomason Hospital, five out of eight sweepers were attacked, and almost every one of the Native Doctors and attendants had premonitory symptoms, which were checked by the Cholera pills. In the Central Prison, neither the patients in hospital, nor the attendants suffered more severely than the other prisoners, though, in the Epidemic of 1856, the hospital sweepers suffered very severely. The Native attendants in the European hospitals did not suffer severely."

Agra had formerly the reputation of possessing a healthy climate for European Troops, although it has not unfrequently been severely attacked by Epidemic Cholera. During the last few years, the apparent salubrity of the station has much fallen off. There was a serious outbreak of Cholera in 1860, in which the European Troops suffered more severely than during the late Epidemic, and fever has been extraordinarily prevalent.

The accommodation provided for the European Troops consists partly of buildings erected many years ago, and partly of newer barracks built in 1855-56. The new Infantry Barracks, occupied during the late Epidemic by the 42nd Regiment, are six in number. They stand in echellon, facing towards the north-west and south-east. Each of the barracks for unmarried men consists of a long centre room, 24 feet broad and 24 feet high, with a double verandah on each side. The centre room is divided into four compartments, each 72 feet long, and these are connected with each other, and with the inner verandahs, by open arches. At each end of the building there are four small rooms for Sergeants, and a room used as a reading-room or mess-room. The floor is raised three feet above the ground outside. The roofs are thatched. The ventilation of the rooms is imperfect. Each of these barracks was intended to hold 96 men in the centre room, or 24 in each compartment. This allows to each man 1,728 cubic feet of space, and a superficial area of 72 square feet. When the Cholera appeared, the men were too much crowded. The average number in each barrack was about 120. It thus became necessary to occupy the inner verandahs on the east side as sleeping wards, an arrangement which seriously interferes with the proper ventilation of the barrack.

The latrine for each barrack is 23 yards from the south-east corner of the main building, and connected with it by a covered way. The plan of the latrines, as well as their situation, is objectionable. The wash-house and urinary are under the same roof, 15 yards from the centre of the barrack, with which it communicates by a covered way. The

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refuse water from the wash-house and urinary drains into a cess-pool, 48 feet deep. The cess-pools, which have only lately been constructed, are covered in, and a chimney of masonry is carried up from the centre of the roof to a height of 16 feet. These arrangements have been carried out at a considerable expense, but the result is very unsatisfactory, and these cess-pools can never be anything else than highly objectionable. At the commencement of the Epidemic, only one of these covered cess-pools had been finished. The water from the wash-houses and urinaries was at that time received into open cess-pools, a few feet deep, the condition of which had formed the subject of frequent complaint by the Military and Medical Authorities. Dr. Furlong, Surgeon of the 42nd Highlanders, reported in April 1861, that these cess-pools were emptied from time to time "by throwing the contents out on the surrounding ground, thus causing constant effluvia, saturating the ground with an offensive compound." After the rains set in, this nuisance became doubly objectionable, for the ground was often under water, and the filthy contents of the cess-pools were thus spread over a larger surface. This was at last considered so dangerous to the health of the men, that Brigadier Troup ordered the entertainment of a temporary establishment for the daily removal to a distance of the contents of the cisterns until the new covered cess-pools should be finished.

The barrack occupied by the married men and their families is on the same plan as that of the barracks described above, the large rooms being divided off by partition walls, 6 feet high.

The hospital occupied by the 42nd Highlanders consists of two buildings, running north and south, parallel to each other, and connected at the south ends by a covered passage. In the centre of this passage stands the wash-house. The latrine and urinary are close to the south-east corner of the western ward of the hospital. The urinary drains into a cess-pool, constructed like those of the barracks. The latrines of three barracks are in objectionable proximity. Each wing of the hospital is divided into two compartments, which communicate through a lofty arch-way of 12 feet square. There are double verandahs, similar to those of the barracks, and at each end there are two small rooms. In the west wing, the total length of the centre room, including both compartments, is 150 feet, and the height 29 feet; and in the east wing the length 123 feet, and the height 24 feet. The rooms in both wings are 24 feet broad. The east wing is said to have been intended to accommodate 25 patients, and the west wing 32. This gives, in the former case, an allowance to each patient of 1,980 cubic feet of space and 83 superficial feet; and in the latter case 2,100 cubic feet and 90 superficial feet. When Cholera appeared there were altogether in the

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two wings 33 patients. Thirty-four venereal cases were at this time treated separately in the Fort.

The hospital buildings, like the barracks, are much blocked up by the great extent of wall in the wards and inner verandahs, and the ventilation is very imperfect.

The Female hospital stands in the north-east corner of the hospital enclosure. It consists of one ward, 48 feet long by 22 feet broad, and 27 feet high, with a verandah all round. Attached to it is a very bad latrine on the cess-pool principle.

The sanitary condition of the ground in the immediate neighbourhood of the hospital enclosure is very far from satisfactory. It is low, badly drained, with a number of offensive latrines close around it, and a Native Bazar not far off.

The old Infantry Barracks, seven in number, were occupied during the Epidemic by Her Majesty's 107th Regiment. Each of these consists of a room 142 feet long, 24 feet broad, and 24 feet high, with a verandah on each side, and two small rooms at each end. They were each intended, it is said, for 62 men. With this number, each man would have 93 superficial feet and nearly 2,250 cubic feet of space.

The hospital consists of a long centre room divided into eight compartments, each 18 feet by 24, and 24 feet high, opening into an enclosed verandah on each side. The ventilation is imperfect. The building is said to have been intended for 64 patients, and with this number the allowance of space to each would be about 2,000 cubic feet and 54 superficial feet. When the Epidemic commenced, there were 35 patients in the hospital.

The latrines are on the usual surface system. The urinaries drain into covered cess-pools, like those already described.

The Artillery are for the most part accommodated in two old barracks, containing a long centre room, 213 feet long, 24 feet broad, and 20 feet high. Parallel to this, along the whole length of the centre room, there is a second room of the same height, and 16 feet broad. There are small rooms at the end of the building, and a verandah runs along both sides. The roof is flat, with over this a second tiled roof. These buildings, although old, are well constructed, and the ventilation is good. Each of the main wards was intended to hold 69 men. This gives an allowance per man of 1,481 cubic feet and 74 superficial feet, without counting the side rooms. At the time of the outbreak of Cholera, there were 27 men in one of these barracks, and 52 in the other.

The Artillery Hospital consists of a main ward, 110 feet long by 24 feet broad and 24 feet high, with a double verandah and flat roof. The inner verandah at both ends is enclosed, and divided into three small rooms. This hospital is intended to hold 36 patients. With this number, the allowance of space per man is 1,760 cubic feet and 72 superficial feet. There were only seven patients in the hospital when the Epidemic commenced.

The latrines provided for the Artillery Barracks and hospital were very bad. In the hospital enclosure the filth from the latrines was first collected in a small open receptacle of masonry, from which it was removed into an adjacent cess-pool. There are six old cess-pools of this kind, which have been filled and closed, and one was still open and in use. A more objectionable arrangement could hardly be contrived. The urinaries, as in the Infantry lines, drain into cess-pools.

In the system of conservancy in force in the Agra Cantonments, there was nothing which seems to demand special notice, in addition to the points to which reference has already been made, but it was very imperfect and objectionable. The drainage of the Cantonments in the vicinity of the barracks was also extremely bad, and the sanitary state of the Agra Cantonments was altogether very unsatisfactory.

The Fort of Agra is usually occupied by a Company sent from the Cantonments. It contains two barracks, each consisting of a room 205 feet long, 24 feet broad, and 16 feet high, communicating on both sides with an enclosed verandah. There is a flat roof, with a second tiled roof above, with openings for ventilation. Each of these barracks was intended to hold 68 men, and with this number there would be an allowance per man of 1,152 cubic feet and 72 superficial feet. The number has, however, frequently been larger in consequence of the occupation of one of the barracks as a separate hospital for venereal cases. On the outbreak of Cholera, about 100 men occupied the eastern building, and the men were consequently much crowded. The hospital contained about 60 patients. These two barracks are connected at both ends by a wall, 10 feet high, an arrangement which seems unnecessary and objectionable. Under the wall on the south side are the latrines, badly constructed and offensive.

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The following Table shows the strength of the European Troops at Agra when the Epidemic commenced, and the number of cases of Cholera that occurred :—

Regiment.	Strength.			Cholera.						Percentage.								
				Men.		Women.		Children.		Cases to Strength.			Deaths to Strength.			Deaths to Cases.		
	Men.	Women.	Children.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Men.	Women.	Children.	Men.	Women.	Children.	Men.	Women.	Children.
Her Majesty's 42nd Highlanders	649	33	38	54	39	2	...	...	...	8·3	6·1	...	6·0	...	...	72·2	...	...
Her Majesty's 107th Regiment	393	32	38	47	25	5	2	3	3	11·9	15·6	7·9	6·3	6·2	7·9	53·2	40·0	100·0
Bengal Artillery Division	111	15	31	8	3	...	...	2	1	7·2	...	6·5	2·7	...	3·2	37·5	...	50·0
Total	1,153	80	107	109	67	7	2	5	4	9·5	8·7	4·7	5·9	2·5	3·7	61·5	28·6	80·0

The following Table gives similar particulars for the Native Troops :—

Regiment.	Strength.			Cases of Cholera.						Percentage.								
				Men.		Women.		Children.		Cases to Strength.			Deaths to Strength.			Deaths to Cases.		
	Men.	Women.	Children.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Men.	Women.	Children.	Men.	Women.	Children.	Men.	Women.	Children.
38th Regiment N. I.	662	49	53	15	5	4	2	..	...	2·3	8·2	...	0·8	4·1	...	33·3	50·0	..

The Head Quarters and seven Companies of Her Majesty's 42nd Highlanders arrived at Agra in April 1861. The Regiment had been stationed during the greater part of the two previous years at Bareilly and Moradabad, and the health of the men had been generally very good. For the first three months after their arrival at Agra, there was no prevalence of any disease dependent in any way upon climate or barrack accommodation. There was very little diarrhœa. The general arrangements of the Regiment were excellent, and there was nothing that could be discovered in the nature of the duties or habits of the men likely to render them specially liable to the attack of Cholera.

The first case of Cholera among the European Troops occurred in Her Majesty's 42nd Highlanders on the 21st of June. On this day a man was attacked; he died, and on the 28th and 29th June there were two more fatal cases. These, as well as the first case, were admitted from the barracks; after this there was no more Cholera in the Regiment until the 14th July, when there were three cases, two of them fatal. Two of these occurred in barracks, and the third man attacked was a patient in hospital suffering from fever. From this date there were two or three cases daily until the 24th July, when the number rose to eight.

It was then considered urgently necessary by Dr. Murray, Deputy Inspector General of Hospitals, that the Troops should leave the Cantonments; and, in accordance with his recommendation, in which the Regimental Surgeon concurred, arrangements were made for going into camp. The rain was very heavy and constant, and the Regiment did not start until the 27th July, when it marched to Secundra, a distance of about eight miles from the Cantonments. Up to this date there had been among the men 36 cases and 20 deaths.

At Secundra the men were quartered in the extensive buildings which surround the tomb of the Emperor Akbar. The ground was much overgrown with rank vegetation; a portion of the buildings had been lately occupied by a party of prisoners, and the sanitary condition of the place was not very satisfactory. On the 27th and 28th there were four fatal cases. On the 29th the men were moved out of the corridors of the tomb into tents. The camp changed ground every two or three days, moving only a short distance. From the 29th July to the 2nd August, when Cholera disappeared from the camp, there were three fatal cases. There were altogether in camp 13 admissions and 7 deaths. The change from Cantonments was apparently very beneficial. It would probably have been still more so had the measure been adopted at an earlier stage of the Epidemic.

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The sick in hospital were not moved into camp with the rest of the Regiment. The men were suffering a good deal from intermittent fever before they left the Cantonments. This increased in severity in camp, and it continued very prevalent after the 13th August, when the men returned to their barracks. Fever was excessively common among both Europeans and Natives after the cessation of Cholera. The 42nd Regiment suffered so severely that there were at one time 200 men in hospital, and hardly 100 men in the whole Regiment were fit for duty.

The liability of the hospitals to be attacked by Cholera is shown in an extraordinary manner in the history of the Epidemic in this Regiment. There were altogether in the Cantonments 41 cases, of which 32 were fatal, and they were distributed as follows:—

	Cases.	Deaths.
Admitted from men in barracks	24	17
Ditto from patients in hospital with other diseases	17	15

The average daily healthy strength in Cantonments was 568, and the average daily number of patients in hospital with ordinary diseases between the 14th July and the 8th August was 68. Thus we have the following comparative results:—

	PERCENTAGE.		
	Cases to Strength.	Deaths to Strength.	Deaths to Cases.
Among healthy strength	4·2	2·9	70·8
Among patients in hospital with other diseases	25·0	22·1	88·2

The men in barracks were more than eight times as numerous as the patients in hospital, yet nearly one-half of the whole number of fatal cases occurred among the latter. Eight of the patients attacked in hospital were suffering from fever, five from diarrhœa, one from dysentery, one from asthenia, one from icterus, and one from cornitis. There were no cases of Cholera among the Medical Subordinates, nor among the Native Establishment attached to the hospital.

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Hospital orderlies were supplied as usual. Dr. Murray says in his Report, that they were "exposed to unusual fatigue and anxiety, as well as contagion, and suffered much." It has not been ascertained how many of these men were attacked by Cholera. In three cases, at least, men were seized while in actual attendance at the hospital.

The management of the men in barracks during the Epidemic was excellent. The plans were adopted which had been successfully carried out by Dr. Murray during previous Epidemics of Cholera. The men were inspected by the Medical Officers morning and evening, and the premonitory symptoms of disease were treated in the barracks, without obliging the men to go to hospital. The Regimental and Medical Officers exerted themselves to the utmost to gain the confidence of the men, and to induce them to apply for medical assistance on the slightest symptom of disease. The disinclination of the men to be sent into hospital is stated by the Medical Officers to have been extreme.

During the month of July, 72 cases of diarrhœa were successfully treated in the hospital of the 42nd. This number does not include the numerous slight cases treated in barracks. In the great majority of cases at Agra, diarrhœa preceded the attack of Cholera.

Not much can be said regarding the cases which appeared to have their origin in the barracks. It did not appear that any of the buildings were attacked in a manner which showed them to be peculiarly liable to the epidemic influence. In the barrack No. 3, occupied by the 6th Company, there were five fatal cases near the centre of the building, where the covered way from the urinary joins the barracks. Offensive effluvia were often observed there, and the Medical Officers considered at the time that these were brought into the building through the covered passage. The centre portion of the barrack was therefore abandoned, and the same measure was adopted in the other barracks also.

Her Majesty's 107th Regiment had left Agra before the arrival of the Commission, and the information regarding it is not very complete.

The first case of Cholera was admitted from the barracks on the 7th July. There were no more cases until the 11th July, when the disease again appeared. It reached its climax between the 18th and 26th July, and finally disappeared on the 14th August.

The special liability of the hospitals to be attacked by Cholera was shown strongly in this Regiment, although not to the same degree as in the case of the 42nd Highlanders. Between the 7th and 27th July the average healthy strength of the Regiment per diem was 336, and the average number of patients in hospital with other diseases than Cholera was 50. There were admitted from healthy strength during this time 28 cases, of which 12 were fatal, and among the hospital patients there were 5 cases, of which 4 were fatal. We have therefore the following comparative results:—

	PERCENTAGE.		
	Cases to Strength.	Deaths to Strength.	Deaths to Cases.
Among healthy strength … …	8·3	3·6	42·9
Among patients in hospital with other diseases … … … …	10·0	8·0	80·0

During the same period three men were attacked with Cholera in the hospital, who were employed there on orderly duty. Of the patients who were attacked in hospital, two were suffering from fever, two from venereal diseases, and one from bronchitis.

On the 27th July it was determined to leave the Cantonment; and, with the exception of the married men, who remained with their families, the men marched to the Taj, a distance of about two miles. They were at first placed in the buildings on each side of the tomb, and they remained in them for the first three days. Tents were then pitched about two miles off, in which the men slept at night, but they returned to the Taj during the heat of the day to obtain the shelter of the trees and buildings.

The results of the removal from Cantonments were apparently very satisfactory, for, from the 27th to the 29th July, there were no fresh cases of Cholera, while in the previous three days there had been ten cases. So few men, however, remained in Cantonments after the 27th July, that the means do not exist of making a fair comparison. Among the married men who remained, and among the women and children, there were altogether three cases of Cholera between the 27th July and the 14th August. On the 30th and 31st July, three cases occurred among the men in camp. There was another case on the 13th August, and another on the following day. Altogether in camp there were six cases and four deaths. "On the night they moved out of Cantonments," writes Dr. Murray, "each of the men got one of the Cholera pills, and an extra glass of grog; they said they wanted another pill next night, as they had not had such a good night's rest for many days. It was not

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given, as there had not been a single case during the night or day; but it would have been allowed had the disease continued severe."

The hospital remained in the Cantonments. Among the patients with ordinary diseases, there was one case of Cholera in addition to those that have been already noticed. It occurred on the 14th August in a patient suffering from fever. There was one case of Cholera among the Subordinate Medical Establishment, and one case among the Native Establishment attached to the hospital.

The arrangements made for treating premonitory symptoms in barracks, without compelling the men to go to hospital, were similar to those adopted in the 42nd Regiment.

Eight of the cases in the 107th Regiment occurred in the detachment at the Fort, and six of them were fatal. Three of the latter took place in the hospital which had been established for the treatment of venereal cases. There were 22 patients when Cholera commenced. This hospital was broken up when the men were sent into camp.

The extreme prevalence of intermittent fever in the 42nd Regiment after the cessation of Cholera has been noticed. The 107th Regiment also suffered very severely. Nor was this peculiar to the European Soldiers. The Native inhabitants generally appear to have suffered from fever to a most unusual degree.

The men of the Bengal Artillery arrived at Agra, in December 1860, from Bareilly. Their health was good before the appearance of the Epidemic. In the general management of the men, their duties and habits, there was nothing peculiar. The first case of Cholera occurred on the 17th July. Seven men were attacked between this date and the 24th July, after which there was only one case among the men. This was on the 30th July. On the 3rd and 6th August two children were attacked. There were no cases among the women. The average number of patients in hospital with ordinary diseases during the Epidemic was only six or seven, and the building was capable of accommodating a much larger number. There were no cases of Cholera among the hospital patients. There were altogether only three deaths from Cholera among the men of the Artillery. There was no prevalence of diarrhœa either before or during the Epidemic. The Artillery did not move into camp.

There were two cases of Cholera, both of them fatal, among the European Officers at Agra. One of these cases occurred in the Artillery, and the other in Her Majesty's 42nd Highlanders.

It will be seen from the Return already given that the cases of Cholera among the Native Troops at Agra were not numerous. No special remarks are necessary regarding them.

The exertions of Brigadier Troup and of Dr. Murray, Deputy Inspector General of Hospitals, were indefatigable. These Officers received the acknowledgments of the Governor General in Council for their excellent services. The measures taken in concert with the Regimental and Medical Officers, and with their hearty co-operation, for carrying out a system of daily inspection of the men, and for the treatment of premonitory symptoms in barracks, were of the highest value, and it is probable that they had the effect of greatly diminishing the virulence of the disease.

The following extract from Dr. Murray's Report shows the nature of the arrangements which were generally adopted :—

" On the approach of the Epidemic to the vicinity of Agra, particular attention was paid to all the conservancy arrangements. The old drains were cleared out and fresh ones constructed. The men were carefully warned to avoid using unripe fruit, bazar pork, and any kind of food they found they could not digest easily. They were recommended to be moderate in the use of alcoholic liquid, which was not always attended to when the disease became bad. They wore flannel belts, and changed wet clothes when practicable. Sites in the vicinity were selected, to which the Troops would be moved, should the disease become severe, and the Commissariat Officer was instructed to be ready to move the camp equipage at a short notice. When the disease appeared, Native Guards were substituted for European when practicable ; shooting matches, dancing, and games of all kinds were encouraged. The men were carefully inspected by the Medical Officers morning and evening, and small doses of Quinine and Cherytta were given in the morning, with the effect of improving the tone of the stomach and digestion.

" The most important prophylactic was the use of the Cholera pill immediately the bowels became out of sorts. There is a natural antipathy to being sent to a Cholera Hospital, which leads the men to conceal their complaint till the disease has advanced too far for medical treatment. The pills were distributed to the Non-Commissioned Officers in each barrack, with instructions to give one to every man who asked for it. The first pill checked many cases that, if neglected, would have progressed to collapse. The men had confidence in them, and were more willing to go to hospital if the disease continued. The second pill kept the disease in check until the Medical Officer ordered more active remedies. This is an exceptional mode of treatment of Soldiers, but this is an exceptional disease. The early exhibition of the remedy is of essential importance, when half an hour's delay may allow the disease to advance beyond remedy. The men should be encouraged to tell the Doctor the effect of the pill, who will know something more is required, should the stools continue white, though not frequent. There are many remedies confidently recommended as valuable at this early stage; Calomel and Opium, Brandy and Opium, Chloroform, Sulphuric acid, &c., &c. I prefer the pill, as being an efficacious remedy, convenient for distribution, keeping well, easily distributed, and not likely to do harm if taken when not required. The Natives have confidence in them, and have used several lakhs of them during the late Epidemics, and the European Soldiers take them with confidence. They are composed of one part Opium, two parts Black Pepper, and three parts Assafœtida, made into pills of 5 grains each."

GWALIOR AND MORAR.

We proceed to give an account of the Epidemic at Gwalior and Morar. With the single exception of Meean Meer, the mortality among the Troops was greater at Morar than in any other station of Upper India.

The city of Gwalior, the capital of the territories of Sindhia, is situated about 65 miles to the south of Agra. Adjoining it, on the west side, is the Lushkur, so called because it was once the site of the permanent camp of the Marhatta Sovereigns. This has now become a large town, more populous and wealthy than the old city of Gwalior.

Major Meade, who was at that time Political Agent at Gwalior, has given the following account of the outbreak of Cholera among the Native population:—"The Cholera made its appearance in the Lushkur about the 12th or 15th July, and for four or five days it was said to have raged with much violence, the number of deaths that occurred within that period being variously stated at from 500 to 1,000. Subsequent information, however, satisfied me that the lower number was probably an exaggeration. It is to be noticed that Cholera did not break out in the lines of Sindhia's Troops (called the Campo) about a mile to the south-west of the Phool-bagh; nor in the Phool-bagh itself, which is about half that distance and north-east of the Lushkur; nor in the city of Gwalior, which lies round the northern end of the rock on which the Fort is built, and about a mile and a quarter to the north of the Phool-bagh. The disease had ceased to rage with violence in the Lushkur three or four days before it first appeared in the Cantonments, and the total number of deaths from it therein, between the 21st July and the 13th August inclusive, as taken from the daily mortality rolls of each Thanna, which I have procured from the Durbar, amounted to 104; viz., from the 21st to 31st July inclusive, 24 men, 19 women, and 24 children, total 67; from the 1st to 13th August inclusive, 17 men, 9 women, and 11 children, total 37. This number cannot, I think, be considered large, with reference to the great population of the Lushkur, upwards of 100,000, and to the numerous poor people of the place who had for months been suffering more or less from the prevalent scarcity of food."

The Military Cantonment of Morar is situated about four miles from the city of Gwalior, on the east bank of the Morar River. This is a considerable stream, and a dam having been thrown across it a little lower down, it forms a long sheet of water, affording an abundant supply of water to the station, and great facilities for bathing and boating. Before the mutinies of 1856 there were no European Troops at Morar.

The site of the present Cantonment was not well chosen. It stands in a valley, surrounded on three sides by low hills; but the insufficiency of the space below has lately rendered it necessary to occupy some of the higher ground on the east side, and five new barracks have been built there for the Artillery. The situation of these is very superior, and it is much to be regretted that there has been so great an expenditure of money in the lower portion of the Cantonment.

The soil is generally clay. Except in the gardens of the Officers, where there is an ample supply of water for irrigation, the ground during the greater part of the year is bare and arid. The hills in the vicinity are dry and almost devoid of vegetation. The water in the wells in the valley is plentiful, and is supposed to be generally good. Its quality, however, requires more complete investigation. More wells are required for the barracks situated on the hill. The drainage of the ground in the immediate vicinity of some of the barracks has been very defective, but measures have been taken for its improvement.

The Infantry Barracks occupy the northern portion of the lines, and the Artillery the southern.

Twelve Half-Company Barracks have been finished for the Infantry. Each contains two wings, separated by a Mess-room in the centre, 48 feet long by 25 feet broad. Each wing is 67 feet long and 24 feet broad, and there are two smaller rooms for Sergeants. The height of all these rooms is 24 feet. There is a verandah, 10 feet broad, on each side, and the floors are raised 3 feet above the ground. Each of the large rooms was intended for 24 men. This gives to each man about 1,600 cubic feet of space and 67 superficial feet.

The barracks are good, but when Cholera appeared, they were overcrowded. The average number of men in each of the large rooms was about 30, but in a few cases it was considerably larger. Each man had on an average about 1,200 cubic feet of space, but only 53 superficial feet, the latter a very insufficient allowance. In the small rooms, each of which was intended for two men, six men were often placed. The ventilation of these rooms is defective, and, although the amount of space for each man was somewhat greater than in the large rooms, they were in fact still more objectionably crowded. It was found impossible to occupy them in hot weather, and this led to an encroachment on the large barrack rooms, a small space being partitioned off from each for the accommodation of Staff Sergeants. This was an original error in the plan of these barracks. They are certainly not adapted to hold a larger number of men than that for which they were designed.

Two of the Half-Company Barracks were occupied as the hospital. The absence of a separate hospital, which is much wanted, has been the main cause of the overcrowding in the barracks.

Besides these buildings, there are three older barracks, [" semi-permanent"]. One of these, No. 14, was occupied by the Light Company. This is 422 feet long. It contains five rooms, each 78 feet long, 26 feet broad, and 20 feet high. The floor is only raised six inches above the ground. Each man had a larger amount of space than in the Half-Company Barracks, but in all other respects the accommodation was inferior. The drainage in the vicinity of this barrack is very defective.

There was a great deficiency at Morar in every provision for the amusement or occupation of the men. There was no Ball-Court, or Skittle-Alley, nor are there any proper buildings for Library, School, or Workshops.

The latrines are on the surface principle, but very faulty in construction, and, as well as the urinaries, they were in an offensive condition when the Commission visited Morar. This applies to those both of the barracks and hospitals. The ordinary system was in force for the daily removal of filth. This was thrown down upon the ground, just outside the Cantonment boundaries, about three quarters of a mile from the barracks, and nearly due east from the Infantry lines. No attempt was made to bury or otherwise dispose of it, and this accumulation of filth was a very objectionable nuisance, more especially since it was so situated that the prevailing wind during the rainy season would blow directly across it toward the barracks. Altogether, although representations had frequently been made, and although orders had often been issued, the state of the conservancy was as far from satisfactory as at most other stations that were visited.

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The following Table shows the strength of the European Troops at Morar when the Cholera appeared, with the number of cases and deaths that occurred :—

REGIMENT.	STRENGTH.			CASES OF CHOLERA.						PERCENTAGE.								
				Men.		Women.		Children.		Cases to Strength.			Deaths to Strength.			Deaths to Cases.		
	Men.	Women.	Children.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Men.	Women.	Children.	Men.	Women.	Children.	Men.	Women.	Children.
H. M.'s 27th Regiment	884	80	158	197	143	19	12	32	26	22·3	23·8	20·2	16·2	15·0	16·5	72·6	63·2	81·3
Bengal Artillery Division 2nd Company, 4th Battalion, and 2nd Company, 5th Battalion ...	211	25	25	12	8	1	1	4	4	5·7	4·0	16·0	3·8	4·0	16·0	66·7	100·0	100·0
Total ...	1,095	105	183	209	151	20	13	36	30	19·1	19·0	19·7	13·8	12·4	16·4	72·3	65·0	83·3

The following shows the strength of the Native Troops at Morar. Not a single case of Cholera occurred among them:—

	No. of men.
18th Bengal Cavalry	275
35th Regiment Native Infantry	595
45th " "	274
Gwalior Camel Corps	228
Total ...	1,372

The men of the 27th Regiment were generally strong and healthy when Cholera appeared among them. The Regiment suffered severely from fever at Peshawur and Nowshera in 1857. In April 1858 it marched to Umballa, where the health of the men greatly improved. The Regiment reached Morar in December 1860. The duties were light, and there were no apparent causes likely to render the men specially liable to the attack of Cholera.

The health of the Artillery was also very good when the Epidemic appeared.

There was a severe attack of Cholera in 1860, and these repeated outbreaks have given Morar a bad reputation for healthiness. It may, however, be doubted whether this is deserved. If we leave out of the question these Epidemics of Cholera, on which it is hardly possible to lay much stress in considering the general climate of the place, Morar has not been an unhealthy station for European Troops. It is remarkable that not many years ago, Gwalior and Morar had the character, apparently well founded, of enjoying an almost complete immunity to the attacks of Epidemic Cholera.

On the 22nd July the child of a man of the 27th Regiment was attacked with Cholera in No. 2 barrack, in the quarters of the married people. On the 23rd a woman in the same building was attacked, and on the 24th the disease appeared in the hospital. After this, its virulence increased with such extreme rapidity that, up to the 31st July, there were among the men, women, and children of the Regiment 70 cases of Cholera and 38 deaths.

On the 29th July, up to which time there had been eight cases of Cholera in the Light Company, the old barrack occupied by this Company was vacated, and the men were moved into the new barracks on the hill in the Artillery lines. The barracks similarly situated, which were occupied by the Artillery, proved, as will be shown further on, very healthy. But the men of the Light Company, after their removal, were constantly employed upon orderly duty in the Infantry Hospital, and,

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perhaps for this reason, gained nothing by the change. The Company lost more men than any other Company in the Regiment.

From the very commencement of the Epidemic, the patients in hospital under treatment for other diseases were found to be specially liable to the attack of Cholera. On the 22nd July, when the Epidemic first appeared in the Regiment, there were 68 patients in hospital. The most prevalent disease was fever of a mild type. Up to the 31st July, there were eight cases of Cholera among the patients, and seven of them were fatal.

It was at last determined to order the removal into camp of at least a portion of the Regiment. Causes which need not now be stated unfortunately prevented the earlier adoption of this measure.

A camp was in the first instance formed about five hundred yards from the Infantry Barracks, and five Companies of the Regiment were encamped there on the 31st July. On the same day, two Companies, 180 strong, were sent to the Phool-bagh, a house with an extensive garden, belonging to the Maharaja of Gwalior, four miles from Morar, and about a mile to the east of the Lushkur. The Phool-bagh was a place which, from reputation and experience, was believed to be very healthy. During the Cholera Epidemic of the previous year (1860), two Companies of the 71st Highlanders had been sent there with great advantage. The Maharaja of Gwalior, at Major Meade's request, placed the house and gardens at the disposal of the Military Authorities.

The encampment of a portion of the Regiment 500 yards from the barracks, which has just been noticed, did not lead to any strikingly advantageous results. Constant communication, however, went on between the Cantonments and the camp, and the sick were all treated in the Cantonment hospital. Thus, there was no real separation of the men from the places where the disease was raging.

The result of the removal of the men into tents seems, nevertheless, to have been beneficial. Until the 31st July, when the first movements were made, the virulence of the disease had gone on steadily increasing. On that day there were 12 fresh cases among the men. On the 1st August the number of admissions fell to 4, and never again reached so great a height as on the 31st July. The total number of cases among the men in the four days before the move was 42, and in the four days after the move it was 25. The percentage of attacks to strength during the first period was 4·8, and during the second period it was 3·9. The men remained on this ground for six days. During this time, from the 1st to the 6th August, there were 36 cases in Cantonments and camp, the average daily strength of men not attacked by Cholera being 616. Thus, the percentage of cases to strength was 5·8, or 0·97 per diem.

During the same six days, there were three cases of Cholera in the detachment at the Phool-bagh, the average strength being 178. The percentage of cases to strength was 1·7, or 0·28 per diem. Up to this time, therefore, the disease was very much less virulent among the men at the Phool-bagh than in the rest of the Regiment, and the results of the movement were most beneficial. Cases were not sent in for treatment from the Phool-bagh to the Cantonment hospital, and the separation of the men from the Cantonment was far more complete than it was in the encampment near the barracks.

On the 6th August Brigadier Welchman visited the proposed encamping ground at Girgaon, the position of which has already been noticed. Tents had been previously sent out; and, finding that the ground was ready to be occupied, the Brigadier gave orders that the men encamped near the barracks should march the same day to Girgaon. After all the beds and nearly everything else had been sent off, except the men's bedding, there was a violent storm of rain, which swamped the old encamping ground and stopped the march. The men were sent into the barracks for shelter, and, as no other arrangement appeared at the moment possible, they remained there during the night. The greater part of the bedding was left upon the ground in the tents, without the slightest necessity, and became very wet, and as the men had no change of clothing available, they were exposed to much discomfort and risk. These unfortunate circumstances might, in a great measure, have been avoided by better Regimental arrangements. They might have been expected to aggravate the virulence of the disease, but no such result appears to have followed.

On the 7th August the men who had been encamped near the barracks marched to ground near the village of Girgaon, which lies on the north-west slope of a low range of hills about four miles to the north of Morar.

The following Table shows the number of cases which occurred, from the 7th to the 17th August, in the Cantonments, in the camp at Girgaon, and at the Phool-bagh :—

PLACE.	Average Strength not attacked by Cholera.	Cases of Cholera.	PERCENTAGE OF CASES TO STRENGTH.	
			Total.	Per diem.
Cantonments	273	42	15·4	1·40
Camp Girgaon ...	314	16	5·5	0·45
Ditto Phool-bagh ...	175	4	2·3	0·21

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These figures show very forcibly the virulence with which Cholera continued to prevail in the Cantonment, and the excellent results of the movements into camp. The change to Girgaon was highly beneficial, but the detachment at Phool-bagh was still by far the healthiest portion of the Regiment.

On the 16th August, Dr. Murray, Deputy Inspector General of Hospitals, within whose circle of superintendence Gwalior and Morar are situated, arrived from Agra. Although the change to the camp at Girgaon had clearly been very beneficial, the disease had not ceased, and Dr. Murray considered it desirable that the Troops should at once move to fresh ground. On the 17th August a good site for an encampment was found at Oodepoor, about four miles to the south-west of Cantonments. The ground is high and open, on a rocky hill.

The weather was so bad, and the difficulties of transport in the flooded state of the country were so great, that it was thought impossible to carry the bedding and other necessaries for the men from the camp at Girgaon to Oodepoor in one day. It was therefore determined that the men should be brought in from Girgaon to the Cantonments, which lie half way between the two camps; that they should sleep in the barracks which had been fumigated and white-washed, and that they should march on the next day to Oodepoor. The men left Girgaon in the evening, and marched into Cantonments. They were much exposed to wet upon the march, and the arrangements in the barracks were not good. On the 18th August the detachment remained in Cantonments, and on the 19th it marched to Oodepoor, being joined also by 122 men, who hitherto had not left the barracks.

The bad results of this return to the Cantonment are shown by the fact that, on the 18th August, there were five cases of Cholera among the 306 men who had come from Girgaon. The percentage of attacks to strength was thus 1·63 for the day. This was not only a great increase upon the previous average in camp, but it exceeded the percentage of attacks to strength reached on the same day among the men who had never left the Cantonment. Among these, 252 strong, there were four cases, or 1·58 per cent.

On this day, the 18th August, there were no fresh cases among the detachment at the Phool-bagh.

On the 20th August there were two cases of Cholera at the Phool-bagh, and on the following day the detachment joined the camp at Oodepoor. Almost immediately after their arrival, two more men were attacked. No cause can be assigned for this re-appearance of the disease, in a virulent form, at the Phool-bagh, but there can be little doubt that the detachment remained there for too long a time. Although the men

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had suffered comparatively little, Cholera had not left them altogether, and it would have been wise to have tried the effect sooner of removal to another situation.

Upon the whole, however, this case affords a strong example of the immense importance of moving men away from the Cantonments in which Cholera is virulent.

In the 21 days during which the Phool-bagh was occupied by the Troops, there were altogether eleven cases of Cholera. According to the Returns supplied to the Commission, ten of these cases were fatal, but there was some doubt about this, for, according to the Medical History Sheets, only six deaths occurred there. Assuming the higher number to be correct, the proportion of deaths to cases was very large. It was 90·9 per cent. for the cases at the Phool-bagh, while it was 82·6 per cent. for the cases admitted in the Cantonments, and 65·2 per cent. for cases that occurred in the camps. Whether, however, we take the admissions or deaths as our criterion of the advantages of the removal to the Phool-bagh, the general result is the same. The Epidemic was nearly four times more virulent in the Cantonments than at the Phool-bagh, and the men at the Phool-bagh suffered less than any portion of the Regiment. The following Table shows this very distinctly. The cases that occurred up to the 6th August in the camp formed near the barracks have been included with the cases in Cantonments :—

PLACE.	Average daily strength not attacked by Cholera.	Cases of Cholera.	Deaths.	PERCENTAGE.			
				Cases to Strength.		Deaths to Strength.	
				Total.	Per diem.	Total.	Per diem.
Cantonments, 1st to 21st August	348	86	71	24·7 For 21 days.	1·18	20·4	0·97
Camp Phool-bagh, 1st to 21st August	175	11	10	6·3	0·30	5·7	0·27
Camp Girgaon and Oodepoor, 7th to 21st August.	335	23	15	6·9 For 15 days.	0·46	4·5	0·30

The removal of the men to the camp at Oodepoor was very beneficial in its results. In the three days following the move there were only two cases of Cholera among 423 men, who had come from Girgaon and from the Cantonments. The percentage of cases to strength was 0·5, or 0·15 per diem. During the same time, the average daily number of men remaining in the Cantonments, who had not been attacked with Cholera, was about 122. There appear to have been four cases among them. Thus the percentage of cases to strength was 3·3, or 1·1 per diem, but the correctness of some of these figures is doubtful.

After this time few men remained in the Cantonments, except the hospital patients and their attendants. The virulence of the disease now rapidly diminished. After the 29th August there were no cases until the 4th September, but on this day there were three fresh cases.

On the 8th and 9th September two Officers were attacked with Cholera in the Cantonment, and both died. These were the only cases that occurred among the Officers at Morar.

On the 8th and 9th September there were also fresh cases in the camp. On the 13th there was one more case in the Cantonment, and on the 23rd September the last case was admitted in the camp.

After the 24th August to the disappearance of the disease there were altogether nineteen cases, of which thirteen were fatal. The admissions in camp cannot be separated from those in Cantonments, but of the fatal cases, nine belong to the former and four to the latter. The Epidemic thus appears to have retained to the last its greater virulence in the Cantonments.

The camp changed ground from Oodepoor several times, and the men returned to Cantonments on the 3rd and 7th October.

The terror of the hospital was extreme; men often concealed their symptoms rather than enter it, and were brought at last into the hospital almost dead.

When Dr. Murray reached Morar, the abandonment of the hospital in the Cantonment appeared to him to be essential, for it was clear to him that the buildings had become dangerously infected. The sick were hopeless and dispirited, and the Soldiers all looked upon the hospital as a pest house which it was death to enter. It would have been strange if it had been otherwise. Up to the 20th August, out of 211 men that had been admitted into the hospitals in the Cantonment and camps, only 25 had been discharged, and 33 remained under treatment.

The patients in hospital with other diseases had been attacked by Cholera with excessive virulence. The average daily number of sick with diseases other than Cholera between this time and the commencement of the Epidemic was 74. Among them there had been 15 cases of Cholera and 13 deaths. The percentage of cases to strength was 20·3; of deaths to strength 17·6; of deaths to cases 86·6. The patients who were attacked were under treatment for the following diseases :—syphilis 2, fever 6, colic 2, diarrhœa 5.

On the 19th August orders were issued for the removal of the hospital into other buildings. The results of this change were very satisfactory. Dr. Murray states that after it was carried out there was only one more case of Cholera among the patients in hospital, and that the rate of deaths to cases treated was clearly diminished by it.

Hospital orderlies were supplied in the usual manner, and the evils of this system were more strongly marked at Morar than in any station visited by the Commission with the exception of Meean Meer. The men employed in this duty were exposed to great fatigue, and while the disease was at its height the men in Cantonments had sometimes scarcely one night in bed, and often not more than two. For several days more than 80 men were employed daily on this duty in the hospitals.

From the Returns furnished by the Regimental Authorities to show the manner in which the cases and deaths were distributed in the Cantonments and camps, the following Table has been compiled. Cases that occurred among the women and children are included :—

Place of Attack.	No. of Cases of Cholera.	No. of Deaths.	Percentage, Deaths to Cases.
Officers' Quarters...	2	2	100·0
Barracks	137	109	79·6
Hospital	22	20	90·9
Camps	89	52	58·4

These figures show that the movements into camp were not only beneficial in diminishing the number of attacks, but that the mortality among the patients in camp was much smaller than in Cantonments.

While the hospital was occupied, the duration of the fatal cases went on almost constantly decreasing. Thus, among the cases occurring

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at the commencement of the Epidemic, on the 25th and 26th July, in which the patients died in collapse, the average duration of the cases after admission into hospital was 27½ hours. On the 28th July the average duration was 17 hours; on the 29th July it was 12 hours; on the 30th July 10 hours; on the 31st July 9 hours; and on the 18th and 19th August, the average duration of cases fatal in collapse was 6 hours and 7 hours.

It is necessary to notice that the Returns showing the mortality from Cholera in this Regiment do not fully represent the total loss that may be attributed to the Epidemic. Twelve men died of diarrhœa during the prevalence of Cholera. It appears from the Medical History Sheets of these men, that one man died in 23 hours after admission, another in 30 hours, and two others in four days. Of these twelve cases, six were stated by the Medical Officer to be simple diarrhœa, four "diarrhœa choleraica," and two "diarrhœa dysenterica." It appears probable that at least some of these cases would by many Medical Officers have been considered cases of Cholera. The necessity of prescribing some general rules upon this subject has been noticed by the Commission in the last section of their Report.

Of Brigadier Welchman, Dr. Murray, and Colonel Baumgartner, the Report of the Commission speaks as follows:—

"Brigadier Welchman, in all respects, worthily and fully maintained the high character which he long had borne. He was indefatigable in every duty, and he showed, under very difficult circumstances, a determination and decision of character, a soundness of judgment, and at the same time a forbearance and calmness of temper which do him the utmost honor. We can give to Brigadier Welchman no higher praise than this,—that we have no where seen an Officer in whom we should place greater confidence had we to choose a man that we thought thoroughly fitted for command in a time of pestilence.

"Dr. Murray has already received the acknowledgments of the Governor General in Council for the energy, decision, and care which he showed during the prevalence of Cholera at Agra. We think that he merits no less strong encomium for the excellent services which he rendered at Morar.

"Brigadier Welchman has spoken in very high terms of the exertions of Colonel Baumgartner, who commanded the 27th Regiment. In every measure that was adopted, he gave his utmost assistance, and Brigadier Welchman states that, throughout this trying season, under all circumstances whether connected with the camp, or the men in hospital, Colonel

Baumgartner was most indefatigable in his exertions to alleviate, as far as human means could do, the sufferings of the men of his Regiment."

The measures that were carried out by Dr. Mountjoy and Colonel Knatchbull, for the treatment and prevention of the disease in the Artillery Division, were most excellent and successful. They seem to approach so nearly to everything which measures at such a time ought to be, that it is desirable to describe them in some detail.

At the commencement of the Epidemic, the following was the strength of the two Companies forming the Artillery Division at Morar :—

Men	211
Women	25
Children	25
Total ...	261

One Company occupied the old barracks in the plain, while the other Company was stationed in the new barracks on the hill. The former are by no means good. The principal of them resembles the barrack occupied by the Light Company of the 27th Regiment in the Infantry lines. It consists of a long low building, divided into eight large rooms, each 72 feet long, 24 feet broad, and 16 feet high. There are also a number of smaller rooms occupied by Sergeants and others. One end of the building was used as the hospital for the Artillery Division. The ventilation is not good, but the amount of cubic space allowed to each man was sufficient. The Artillery barracks in the lower part of the Cantonment have no advantages of position over those in the Infantry lines, and there are apparently no reasons which should render them less liable to the attack of Epidemic disease. In 1860 the Troops in the Artillery lines suffered severely, and at the commencement of the Epidemic of 1861, the disease appeared to be no less virulent than among the Infantry.

The Artillery Barracks on the hill were remarkably free from Cholera, and their comparative exemption must apparently be mainly accounted for by the fact of their better position. These barracks are similar in plan to the Half-Company Barracks in the Infantry lines.

No special remarks are necessary regarding the conservancy of the part of the Cantonment occupied by the Artillery, there being nothing peculiar in the system followed.

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On the 24th July, two days after the appearance of the Epidemic in the Infantry lines, a little girl, 20 months old, who was ill in the hospital with dysentery, was attacked with Cholera and died. On the 29th July a man was attacked in the lower barrack. No communication could be traced between these first cases and other persons suffering from the disease, or with the hospital.

After this time until the 7th August, cases occurred every day, except on the 31st July and 3rd August. Altogether up to the 7th August there were nine cases. Of these, six had occurred among hospital patients, and of three men attacked in barracks, two had been employed as orderlies in attendance on persons suffering from Cholera.

This peculiar liability of the hospital to attack was exactly what had occurred in the 27th Regiment, and on so many other occasions; but Dr. Mountjoy had now learned the manner in which this and other characteristics of the disease were to be combated. His Report gives the following account of his proceedings :—

"The first case that occurred in the hospital ought," he says, "to have been looked upon as a warning of what was coming. Unfortunately, it required several deaths to give me courage or wisdom enough to push aside the well meaning trammels of the Medical Regulations, and permit only developed cases of Cholera to remain in hospital. I feel convinced in my own mind, that had such a plan of total separation been adopted instantly, after the first death occurred, many of those persons who fell victims to the disease would have escaped, and might, in all human probability, have been alive at this moment. On the 7th August, it became quite clear that something should be done to break through the widening Cholera circle. The hospital was therefore cleared of all the patients, except those suffering from developed Cholera, and one very severe case of dysentery, which could not be removed, and which therefore, as might have been predicted, ended fatally, [and one case of Ophthalmia.] This was in the men's ward. The good effect of this proceeding was at once felt, and thoroughly acknowledged and appreciated by the sick men who were removed out of hospital, and by the sound men in the barracks. The men affected with maladies other than Cholera, being thus removed from the actual presence of the plague, and no longer placed face to face before it, or even near it, and its attendant groans, sights, and odours, plucked up anew their fast sinking hope and confidence. The healthy men in the barracks were made happy, because they saw that they would not be 'sold,' as they expressively termed it, by being taken into the Plague-hospital, should their turn come round to complain of being sick from any of the ordinary diseases. At the same time that the hospital was thus emptied, the Colonel most wisely ordered that a daily inspection of the infected Company, (the 2nd Company, 4th Battalion,) should be made by the Medical Officer.

"The mode in which the infected Company was inspected will be now explained. A table, two chairs, and a supply of medicines were placed in front of the Company, drawn up near to the low, bad barracks then occupied by the men of the Company. The Surgeon being seated at the table out in the open air, directed the Soldiers to walk up, one by one, and say if anything ailed them. It thus became possible to pass each man in review in a pleasant chatty manner, and so detect the earliest approach towards the altered voice, the dull eye, the dark tinge below the eye, the languid gait, and the pallid aspect with or without the beads of sweat standing on the brow. * * * If we wish to fight Cholera on advantageous terms, let us forearm ourselves by watching for the forewarnings which the enemy almost invariably gives us. However mild it may be in its first faint foreshadowings, it is our duty to keep it so by giving timely aid. * * * If it be important to keep Troops moving frequently from one spot to another, during the prevalence of a Choleraic Epidemic, I believe it to be a matter of still greater importance to make, with a certain amount of tact, sufficiently minute inspections of the Soldiers once a day, or, may be, even twice a day. A Soldier will not hesitate, except in rare instances, to tell his Doctor the state of his general health, and the condition of his alimentary canal, provided he sees clearly that the confession of his having what he considers to be a very trifling looseness, perhaps, will not be made the occasion by the Medical Officer to enter the man's name as that of an in-patient of the very naturally dreaded hospital.

"It would have caused great inconvenience, and perhaps some expense, to have moved out the Artillery to any of the neighbouring hills. It would perhaps also have been scarcely politic, in the centre of a Foreign Native State, the Ruler of which has a considerable Mahratta force stationed at the Lushkur, and distant from Morar some three miles only, to have separated the men from their guns. The Artillerymen were therefore not marched out of the station, and I trust that the daily medical inspections will be considered to have amply compensated for the non-removal of the men."

After the hospital was abandoned, no cases except those of confirmed Cholera were treated in it. All other patients were either treated in the barracks or in other buildings. The following Table shows the number of men who received treatment outside the hospital, from the

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7th to the 31st August, on account of real or imaginary premonitory symptoms of Cholera :—

Date.	No. of men treated.	Date.	No. of men treated.
August 7 ...	60	August 20 ...	34
„ 8 ...	70	„ 21 ...	26
„ 9 ...	93	„ 22 ...	31
„ 10 ...	69	„ 23 ...	26
„ 11 ...	95	„ 24 ...	29
„ 12 ...	80	„ 25 ...	25
„ 13 ...	70	„ 26 ...	35
„ 14 ...	74	„ 27 ...	40
„ 15 ...	75	„ 28 ...	40
„ 16 ...	49	„ 29 ...	20
„ 17 ...	30	„ 30 ...	18
„ 18 ...	25	„ 31 ...	15
„ 19 ...	31		

Total No. of days 25. Total No. of men treated 1,160.

Average number of men treated each day 46·4.

Thus nearly 22 per cent. of the whole force received daily treatment. "All the men," says Dr. Mountjoy, "who applied for medicine, complained that they were labouring, more or less, under deranged conditions of health, real or imaginary, and which conditions displayed a tendency in varying proportions towards the Cholera development. Imagination, during a Cholera Epidemic, is almost as powerful for evil as reality, and if a Medical Officer, at such a time, thinks too lightly of those depressed spirits, or that state of imagination brought forth by a season of plague, he will soon find out to his cost that the presumed visionary and ideal malady of the evening will probably appear before him as the too sad reality of the morning. When the Choleraic influence is abroad, any deviation from that normal standard of health, previously enjoyed by an individual, is liable to be tinged by the said Choleraic influence. This assertion may be almost laid down as an axiom. If, then, such a liability to Cholera during a Cholera time characterizes the falling away from standard health, does it not stand to reason that it is most unwise to allow any patient to remain in the same building even with a person suffering under developed Cholera? * * * Medical assistance rendered during the premonitory stage is of the most vital importance. The disease must be sought, and not waited for. * * * When Cholera is fully developed or collapsed, I have no faith in medicines. * * It is to be hoped that the ordinary remedies administered with the hope of curing collapsed Cholera do not do more harm than good. A system of supposed curative treatment which ends in 75 per cent. of deaths can scarcely be classed as curative at all, unless it can be demonstrated that Nature, if left to herself in her battle with Cholera, would fail at the rate of 80, 90, or 100 per cent.”

After the abandonment of the hospital, and the commencement of this system of daily inspections, there were only four cases of Cholera among the men of the Artillery. The first of these occurred on the 12th August. The patient was a man of bad constitution, who had been attending on a man who had died of Cholera in the hospital three days before. He recovered. The second case occurred on the 16th August. This man was the patient suffering from ophthalmia, who, as already noticed, had been left in the hospital on the 7th August. He recovered. The third case, on the 20th August, was that of a man who had been frequently treated for diarrhœa, and who was taking Cholera pills when he was attacked. He had also been in attendance on his brother's child, who died of Cholera on the 12th August. This man died on the 27th August. The last case, on the 21st August, was that of a man, weak both in mind and body, who had been in almost constant attendance upon his sick wife, and upon his child who died of Cholera. This man died on the 24th August.

The following Table shows the comparative virulence of the disease for ten days before, and for ten days after the 7th August, when the new system was introduced. The excellent measures adopted by Dr. Mountjoy had apparently the effect of almost entirely stopping the further progress of the Cholera :—

TIME.	Cases of Cholera.	Deaths.	PERCENTAGE.				
			Cases to Strength.		Deaths to Strength.		Deaths to Cases.
			Total.	Per diem.	Total.	Per diem.	
July 29th to August 7th, 10 days	8	6	3·8	0·38	2·8	0·28	75·0
August 8th to August 17th, 10 days	2	...	0·9	0·09	...	...	...

After the 17th August, there were, as already stated, two cases of Cholera. It deserves notice that both of the cases proved fatal in the stage of re-action, one in 162 hours, and one in 72 hours, the average duration being 117 hours. When patients were treated in the hospital, the average duration of cases which ended fatally in the stage of re-action was 65 hours, and of cases which ended in collapse, 8·3 hours. After the hospital was abandoned, no case was fatal in collapse.

One woman and three children were attacked and died after the 7th August. The woman was attacked on the 10th, while she was a patient in hospital with diarrhœa, the female ward not having been vacated. One child was attacked on the same day. She also was a patient in hospital with dysentery. The second child was admitted from the barracks on the 15th August. The third child was attacked in hospital on the 26th August. The child was threatened with convulsions, and the mother being frightened took it down to the hospital, where it was seized with Cholera. This was the last case that occurred in the Artillery.

After the 15th August, Dr. Mountjoy examined every child daily, and he expresses his regret that he did not carry out this plan sooner.

Altogether out of seventeen cases of Cholera in the Artillery at Morar, eight were among patients in hospital under treatment for other diseases, five among persons employed in attendance on Cholera cases in the hospital, and there were only four cases, two of them fatal, which Dr. Mountjoy considered to have arisen independently of any connection with the hospital. Among the hospital patients who were attacked with Cholera, there were 4 men, 1 woman, and 3 children. Taking the men only, we have the following comparative results :—

Average daily healthy strength	197
Ditto ditto number of patients in hospital with other diseases	13

	Cases.	Deaths.
Admitted from healthy strength	8	5
Ditto from patients in hospital with other diseases	4	3

With the cases admitted from healthy strength five cases and four deaths have been included which occurred among men employed in attendance on patients suffering from Cholera. Thus, the percentage of cases to healthy strength was 4·1, and of deaths to healthy strength 2·5; while, among the patients in hospital with other diseases, the percentage of cases to strength was 30·8, and of deaths to strength 23·1. The percentages of deaths to cases are as follows :—

In cases from healthy strength (exclusive of cases among men employed in hospital attendance)	33·3
Among men employed in hospital attendance	80·0
Among patients in hospital with other diseases	75·0

The diseases from which the patients in hospital were suffering when they were attacked by Cholera were as follows :—

Men ...	2 diarrhœa; 1 fever; 1 ophthalmia;
Women ...	1 diarrhœa;
Children ...	2 dysentery; 1 dentition.

The four cases which apparently had no connection with the hospital, all occurred in the lower barracks. "Not one case of Cholera," says Dr. Mountjoy, "appeared among the men who lived continuously in the hill barracks, which were made over to the 2-5 Company. * * * It is true that the Company lost by Cholera five persons, *viz.*, 2 men, 1 woman, and 2 children, but the deaths occurred in those individuals of that Company who were residing at the time, or who had resided in the Artillery Hospital just previous to the death of attack."

Regarding the system of appointing European Soldiers to attend as orderlies on patients suffering from Cholera, Dr. Mountjoy makes the following remarks :—

" During the late Epidemic, the Natives attached to the Artillery Division presented scarcely any liability to the Choleraic influence. The disease was confined almost entirely to the European portion of the Division. Reflecting on that fact, I became soon convinced that the system of telling off two comrades to attend upon a European Soldier suffering from Cholera is unwise in the extreme. My mind's eye now sees a certain Soldier of the Artillery, who, to all outward appearance healthy, was told off by the Non-Commissioned Officer for hospital duty. As the man leaned over his comrade who was shrieking out in the agony of cramp, the cold sweat on his forehead proclaimed the involuntary dread at work within. The following day saw the sick man and his attendant, the rubber and the rubbed, both in their graves." Dr. Mountjoy proceeds to insist upon the importance of engaging Native servants for the performance of these duties.

No Officers of the Artillery Division were attacked by Cholera.

Dr. Mountjoy deserves high praise for the admirable measures which have been described, and they were the more creditable to him because he had to carry them out single-handed, for he was the only Medical Officer with the Corps. The exertions of Colonel Knatchbull and the Officers of the Artillery Division to keep their men in good spirits during the prevalence of Cholera were great and successful.

Colonel Knatchbull mentioned to the Commission the gratitude which his men felt towards Brigadier Welchman and the Revd. D. Bellamy, the Chaplain of Morar, for their constant care and kindness. Brigadier Welchman has also spoken in the highest terms of the zeal and devotion in the performance of his duties which the Chaplain showed throughout the prevalence of the Epidemic.

FORT OF GWALIOR.

The Fort of Gwalior occupies an isolated sandstone rock, which rises precipitously to a height above the plain of about 350 feet. The hill is about two miles long from north to south, and about a quarter of a mile broad from east to west. The old city of Gwalior lies immediately below the Fortress at its north-eastern extremity, while the Lushkur is similarly situated on the south. The picturesque towers and battlements of the ancient Palace crown the north-eastern portion of the rock. The old buildings are occupied by the Officers of the

Garrison, by the married men and their families, and for Guard rooms and other purposes. For the accommodation of the Soldiers, and for the hospital, six new Half-Company Barracks have been built, four at the southern and two at the northern end of the hill. The barracks are similar to those at Morar. Although they contained at the time of the outbreak of Cholera as many men as they were intended to accommodate, they were not over-crowded. The latrines are all very defective in construction, and those attached to the quarters of the married people were extremely objectionable and offensive. The conservancy arrangements in the Fort were altogether far from satisfactory.

The Fortress was occupied by three Companies of Her Majesty's 52nd Regiment. The following Table shows the strength and the number of cases of Cholera that occurred:—

REGIMENT.	STRENGTH.			CASES OF CHOLERA.						PERCENTAGE.								
				Men.		Women.		Children.		Cases to Strength.			Deaths to Strength.			Deaths to Cases.		
	Men.	Women.	Children.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Men.	Women.	Children.	Men.	Women.	Children.	Men.	Women.	Children.
Detachment H. M.'s 52nd Regiment ...	269	14	25	8	7	2	1	2	2	3·0	14·3	8·0	2·6	7·1	8·0	87·5	50·0	100·0

The health of the men previously to the appearance of Cholera had been generally excellent. The Fort of Gwalior has always had the reputation of being very healthy, and it would perhaps be difficult to find a position in this part of India better suited for European Soldiers. It was visited by Cholera in 1860, but it suffered, as happened during the past Epidemic also, less severely than Morar. The sanitary condition of the place might easily be made excellent, and if Political or Military reasons should not interfere, it deserves consideration whether a larger force might not with advantage be stationed there, and the number of Troops be diminished at Morar. Arrangements would, however, be necessary for obtaining a good supply of water.

The first case of Cholera occurred on the 25th July, three days after the appearance of the disease at Morar, and the last case was on the 22nd August. Seven out of the twelve cases occurred up to the 6th August. There was then a cessation of the disease until the 17th August, when there was one case. On the three following days there were four cases, and the disease then disappeared.

No connection could be discovered between local sanitary defects and the attack of Cholera, except, perhaps, in the quarters of the married people. The higher rate of mortality among the women and children may possibly be connected with the less favorable sanitary conditions under which they were placed.

Of the eight cases among the men, three occurred among patients in hospital, under treatment for other diseases. Two of these were suffering from chest affections, and one from long standing diarrhœa. The average daily healthy strength during the Epidemic was 250, and the average daily number of patients in hospital with other diseases was 18. Among the healthy strength there were five cases and five deaths; among the hospital patients there were three cases and two deaths. Among the former, the percentage of cases to strength was 2·0, and of deaths to strength 2·0, and among the latter the percentages were respectively 16·6 and 11·1. All of the cases admitted from healthy strength proved fatal; among the hospital patients the percentage of deaths to cases was 66·6.

The hospital sweeper died of Cholera; this was the only case among the hospital attendants.

There were no cases among the Officers of the detachment.

Although the total number of cases in the Fort was not great, the form of the disease was extremely virulent. Out of twelve persons attacked, only two recovered. Four of the cases among the men proved fatal in periods from three to seven hours after admission into hospital. The average duration of the three other fatal cases among the men was twenty-one hours. The disease was apparently almost as virulent towards the close of the Epidemic as it was at the commencement.

SIND AND RAJPOOTANA.

Before proceeding with the history of the Epidemic on the left bank of the Ganges, some account must be given of its progress through the great tract of country that lies to the west of Gwalior and Agra, as far as the Province of Sind. Throughout Sind and the States of Rajpootana Cholera was extremely fatal. There was probably no part of the country in which the Native inhabitants suffered so severely, and the circumstances connected with the diffusion of the disease through this tract are deserving of particular notice, because it was apparently in this part of India that the Epidemic first assumed a virulent form. The Commission did not visit any of the Districts of Sind and Rajpootana,

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but were furnished with Reports by Officers who interested themselves in the inquiries.

Dr. Grierson, Deputy Inspector General of Hospitals, has given an account of the ravages of Cholera in Sind during 1861.

It appears that there had been little prevalence of Cholera in the Province since the year 1853, until September 1860. The disease then broke out in Lower Sind, in the neighbourhood of Kurrachee. It attacked many places in this portion of the Province, and extended, though not with any great virulence, to Shikarpoor, and some of the other towns of Upper Sind also. During the cold season of 1860-61 the disease seemed to die out, and the total number of deaths in the Province was reported not to exceed 2,000. In April 1861 Cholera again appeared, and soon spread with great virulence through the Province. During April and May the mortality was very large; in June the disease became much less prevalent, but it did not disappear altogether until a month or two later. In the three Collectorates into which the Province is divided, the number of deaths reported by the Police was as follows:—Kurrachee, 4,604; Hyderabad, 6,807; Shikarpoor, 5,240; total, 16,651. The population of Sind is said to be about 3,000,000.

The Epidemic is reported to have prevailed more severely in the villages than in the towns and cities. Only three European Soldiers died, and among the Native Troops there were only eleven cases and five deaths. The comparative escape of the larger towns and Military stations is remarkable. Dr. Grierson considers that in Kurrachee and other places this may probably, in part at least, be due to the excellent measures of conservancy and sanitary improvement originally set on foot by Sir Bartle Frere.

There is no evidence to show that the Epidemic in Rajpootana was connected with the outbreak in Sindh, which we have been describing, but it is highly probable that this was the case. General George St. P. Lawrence, Agent to the Governor General for the States of Rajpootana, obtained for the Commission much valuable information regarding the Epidemic in this extensive tract.

The numerous States under the protection of our Government, which are included under the name Rajpootana, cover more than 100,000 square miles. Little of this area is directly under British administration, and there are only a few stations which are occupied by European Troops. The principal of these stations is Nuseerabad.

The following account is quoted from an interesting Report sent to the Commission by General Lawrence, and which was drawn up for him by Dr. Lownds, Surgeon to the Agency. It gives a better account of the

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progress of the Epidemic among the Native population of Rajpootana than could be obtained for almost any part of our own territories:—

"The different States have suffered, more or less, from Cholera, and though it is quite impossible to tell with anything like precision the number of deaths which have occurred in any particular State, or even in the principal towns, yet sufficient has been collected to show in a marked manner the general progress of the Cholera and the directions in which it seemed to travel.

"Cholera was general throughout the principality of Bhurtpore in the months of April, May, June, and July, abating somewhat towards the end of the last month. It is impossible to arrive at any estimate as to the number of deaths, but upwards of 680 had occurred among the patients treated at the various Dispensaries and by the Native Doctors, and others sent out into the affected Districts.

"Bhurtpore is bounded on the west by Jyepore, on the north-west by Ulwar, and on the south by Kerowlee.

"Ulwar was first affected, as it appears from the notes furnished by Dr. Mathias, Surgeon to the Political Agency. 'Cholera made its first appearance in the Pergunnahs of Majpore, in the Ulwar territory, early in May last; thence it soon extended to the Districts of Luchmunghur and Govindghur, and then on to Ramghur.'

"It will be seen that it first appeared in the Districts immediately adjoining the Bhurtpore territory, and from thence travelled north and north-west; but to continue Dr. Mathias' narrative. 'The first cases that occurred in Ulwar and its suburbs were seized on the 25th May; both recovered. The disease soon became general, but of a mild type: few deaths, and those chiefly amongst people who had come in from the District; two or three people were carried off daily by it. Thus it went on till the 20th of June, when we had a heavy fall of rain; the disease became less; then a break in the rains; Cholera entirely left us. During this time the Pergunnah of Kishengurh was suffering severely, the mortality being very great in the villages. Early in July, when the rain had well set in, Cholera re-appeared, and cut off many quite suddenly: a purge and vomit or two, cramps, and sudden collapse; then the disease returned to its mild type. All those cases who took opium, assafœtida, and pepper pills, of which a large number were made up both in the Agency and City Dispensary and distributed in the town and Districts, recovered. It was remarked that cases occurring late in the evening and at night were for the most part fatal, while those occurring early in the morning and during the day recovered. In Ulwar about 150 people died. In the Jail, out of 400 prisoners, the deaths amounted to 38. From

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Kishengurh the disease extended to Hindowlee, Byrode, and Byrore, and thence to Tijara; here it was severe. At Rajgurh there were only one or two cases, whilst towards Gazee-ka-thanna and Ajubgurh, the villages in the hills, were quite healthy. The first case occurred on the Bhurtpore and Ulwar frontier, the last on the Goorgaon and Ulwar; the disease was for two months and a half in our District. I have not been able to procure a Return of the number of deaths that took place in the District.'

"Such is Dr. Mathias' account of the Epidemic in Ulwar. It adds but little to our knowledge of the disease generally, but it points out most carefully its apparent track, and the direction in which it travelled from its origin on the Bhurtpore border to the north-western frontier of Ulwar, avoiding the hilly tract of Ajubgurh.

"I regret that I cannot give even such a connected account of the disease in Jyepore and Kerowlee as has been done in Ulwar. In the city of Jyepore the Cholera appeared about the 2nd of July, and continued about two months. The type was mild, and the deaths, though the number is not known, were few; the eastern and western extremities of the town suffered chiefly. Both these localities are very dirty and offensive from want of drainage and other causes. Dr. Burr, in Medical charge of the Agency and Dispensaries at Jyepore, who furnishes these notes, says the disease came from the south-east, from the Gungapoor and Milana Districts, and proceeded north-west from the large tract of the Bhurtpore territory abutting on Jyepore; it would be difficult to say, on the very scanty evidence, what its route was exactly. Kerowlee suffered severely from Cholera, from the middle of June until the beginning of August; many deaths occurred, but the number is quite unknown.

"Next in order to these came the Ajmere and Nuseerabad visitations. Cholera broke out in the former place in the Jail on the 6th of July, and in the Mhair Regiment on the 8th. There were some fatal cases in one of the dirty parts about the 14th. No cases occurred in the Jail after the 31st July, but it continued to rage in the city until the end of August, the last case coming for aid to the Government Dispensary being on the 3rd of September. Only two Europeans, one a Soldier of Her Majesty's 28th Regiment, and a child, were attacked about the middle of July; both recovered; there were no other cases. Among Natives the known deaths were as under:—

	No. attacked.	No. died.
Prisoners	11	3
Mhair Regiment	13	2
Patients coming to Dispensary ...	593	248

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"Dr. T. Murray, who furnishes the above particulars, says, that he has no means of ascertaining the number of deaths in the city. He also says that the disease in its approaches to Ajmere seems to have followed strictly the route from Bhurtpore to that city, as it was heard of at Bhurtpore, Jyepore, and Kishengurh, all on the direct route to Ajmere, before it appeared in Ajmere itself. The Cholera was very fatal in Ajmere, considering the small size of the place.

"In Nuseerabad, the first cases occurred, on the 27th July, in two Natives who had just returned from Ajmere, and two days afterwards it made its appearance amongst the Europeans. It ceased altogether by the 1st of September. There were 50 deaths amongst the Europeans, and 69 amongst the camp-followers. As I am aware that from Nuseerabad full reports have been furnished, I only mention it incidentally, and to complete the chain of evidence as to the progress of Cholera.

"In the Deolee District, which lies to the south-east of Ajmere and Nuseerabad, and to the south-west of Jyepore, Cholera arrived early in July, apparently having come from the east, and this opinion of Dr. Campbell, of the Deolee Irregular Force, seems fully borne out by what I have before recorded in reference to Jyepore and Bhurtpore. In the station of Deolee itself only two cases occurred, but in the surrounding Districts, more specially towards the south, as far as Boondee, Kotah, and Jhalra Putun, its ravages were very severe. In the village of Deolee, about three quarters of a mile from the Cantonment, 12 deaths, and in Punwar 60 deaths occurred. Both the cases among the residents at Deolee were attacked while the patients were visiting their friends at Punwa. In consequence of the prevalence of the disease around, the men of the Deolee Irregular Force were forbidden to visit the villages where Cholera was, and no fresh cases occurred in the Cantonments. A similar immunity of the inhabitants of the Cantonment took place on a former occasion when Cholera was all around and yet the station escaped. This immunity fully confirms the choice of ground, which not only appears unexceptionable, but is so in reality. Dr. Campbell, of Deolee, writes that he cannot assign any special track for the disease, but, as has been said, it arrived from the east. When Cholera first broke out, the prevailing wind was south-west, so that in this case, as has frequently before been remarked as to this disease, it has appeared to spread in a direction almost opposite to that of the wind. A heavy fall of rain in the month of August, amounting to about 23 inches, seemed to exercise a very marked influence in staying the Cholera in the Deolee neighbourhood.

"Cholera was prevalent in Boondee and its villages about the same time that it appeared in the Deolee Districts. The deaths were

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exceedingly numerous, and the pestilence continued to rage for a much longer time than it did either at Ajmere, Nuseerabad, or Deolee. Number of deaths unknown.

"In Kotah it commenced in July, and though it occurred most extensively in that month and August, yet cases occurred up to nearly the end of November. At the Kotah Dispensary 68 cases of Cholera were treated, but this, as far as I can learn, is but a very small proportion of the deaths that took place in Kotah itself, and it was especially fatal in the Districts. The Native accounts of it are far too vague for any reliance to be placed on them, even as to the direction which the Cholera took.

"In Jhalra Putun it prevailed as extensively as at Kotah and during the same months. It is impossible to get even an approximation to the number of deaths. It ravaged the Districts chiefly, I am told, in the direction of Oojein.

"As far as this portion of Rajpootana is concerned, it may be said that Cholera broke out first in the Bhurtpore District; from thence it spread to the north-west and south-east, sparing no District, but there it appears to have stopped. As far as I could learn, it did not spread into the Meywar territory, at least into that portion of it between Nuseerabad and Neemuch. Neemuch was quite exempted from Cholera during the year 1861, though it had suffered severely during the preceding year. It almost seemed to be exactly in the track of the disease when this reached Boondee and Kotah, and yet, as far as can be judged, the infected zone passed directly south without touching Meywar or Neemuch. Were it possible to obtain any definite information on the subject, it would be highly interesting to mark out its boundary line from Deolee on the north towards Neemuch. Its direction appears to have been distinctly modified or rather turned by the ranges of hill passing south and west from Boondee and Kotah, and also by the Bunass and Chumbul Rivers.

"No distinct account of any Epidemic of Cholera in Marwar or Bikaneer up to the middle of September has reached me. It is probable that there were isolated cases here and there at the same time that Cholera was prevalent in Ajmere and Nuseerabad, though here it seems for a time to have ceased, for Beawr, though only thirty-five miles distant, had no cases at all. This is one of the places where Cholera may be said not to occur; for Dr. Small, who has had Medical charge of the Mhairwarra Battalion, and of the Jail and Dispensaries of Nya Nuggur for fourteen years, had not met with a single case of the disease

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during the whole of his incumbency. Soon after the Epidemic of Cholera broke out in Ajmere and Nuseerabad, it was reported to Dr. Small that there were two cases in the city. He immediately saw them, and found them suffering from slight bilious attacks accompanied with some diarrhœa and vomiting of bile, but without any of the symptoms of Cholera. This seems even a more marked escape than in the case of Neemuch, for Beawr lies in the direct track of the Cholera, and has a large traffic with Ajmere.

"The outbreak of Cholera in Marwar and Bikaneer is said to have originated at Ram Deo, a Hindoo shrine, about sixty miles to the north of Jodhpore, where early in September each year a Mela or fair is held. This lasts three days, and is attended by the poorest people of whole Districts around it. Naturally, from the number of persons congregated, and their poverty, much dirt accumulates. In the middle of the fair, Cholera of a most virulent type broke out. Hundreds of the pilgrims are said to have perished on the spot, and the rest fled panic-stricken towards their homes. Very many of these perished on the roads, and many carried the disease to their villages, where, in some instances, as in those between Koochawun of Marwar and Bikaneer, Captain Hamilton reports that the Natives told him that half the inhabitants had died. Some of the refugees went direct to Jodhpore, but their report had preceded them, and Maharajah Tuckt Singh ordered them to remain outside the walls, whither he sent Hakeems and Baids to attend upon them. The precautions were not altogether successful; but so much so that Cholera was only introduced into one or two places within the walls of Jodhpore, and from these it did not spread. Cholera commenced on the 19th September, and ceased on the 16th October; ninety-nine deaths took place in Jodhpore and among the refugees from the fair of Ram Deo treated outside the walls. It prevailed extensively in villages to the north-east and north-west of Jodhpore, but it does not seem to have prevailed to any extent along the high road between Ajmere and Palee. The small Cantonment of Erinpoora, on the direct traffic track, had not a single case, nor could Dr. Eddowes, from whom I have derived my information, hear of any village having suffered on the Marwar border.

"The city of Bikaneer was infected in the same way as Jodhpore, and the disease was evidently introduced by persons who had been at Ram Deo. The first cases occurred on the 28th September in persons who had just returned from the fair. Dr. Coleridge further writes:—'During the next three days, one or two cases occurred, and the disease manifested itself in the city. On the 5th October I was called to two cases in the Fort, and from this time the disease spread rapidly. On the

10th it was very prevalent, and continued so until the 25th of December, from which time only an occasional case has presented itself, and that generally from some out-village. The deaths have ranged from eight to fifty in each twenty-four hours, but the exact number it has been impossible to find. To the 28th November I had attended 200 patients, of whom seven died. Of those who were unattended, or who took native remedies only, I have reason to believe that by far the greater number died.' As Dr. Coleridge has already reported direct to the Cholera Commission, I need not refer further to what he has written. It is said that Cholera has been absent from Bikaneer for seventeen years until the past Epidemic. At the time that Cholera was most prevalent among the inhabitants of Bikaneer, about the middle of November, the cold at night was sufficient to allow ice a quarter of an inch thick to form on exposed ghurrahs of water.

"I regret that I can give no more precise information, but what I have already stated is all that I am able to state on reliable authority. This Report has been prepared by Dr. Lownds, Surgeon to the Agency, who has carefully collected all that he thought might be of interest or importance."

The following extract from a Report supplied to Dr. Murray by Captain Walter, regarding the commencement and progress of Cholera in the Bhurtpore territories, completes the account which can be given of the Epidemic in that part of the country :—

"The Tehsildar of Gopalghur reports that Cholera first broke out at the village of Kythwara at the end of April. Kythwara is distant from Gopalghur eight miles, and from Bhurtpore about forty miles. After eight or nine days the Cholera reached Gopalghur itself, and continued there with great violence for twenty or twenty-five days. It then went off to the villages towards the westward, Bunenie and others; two or three days afterwards it suddenly attacked the villages of Seekree and others in the neighbourhood, and finally spread all over the Pergunnah. The wind, during the time the Cholera raged at Gopalghur, was generally from the east, sometimes from the north, and occasionally from the south. When Cholera first broke out at Kythwara, it had not been heard of anywhere else in the neighbourhood. It went on from Gopalghur to Paharie, and then in a westerly direction towards Ferozpore and the Ulwar District.

"The following Table shows the date of appearance, the duration and mortality from Cholera in the various towns in the Bhurtpore

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territory. The data are supplied by the Tehsildars of the towns, and they may be relied on :—"

Table of Deaths from Cholera in the different cities in the Bhurtpore Territory during the Epidemic attack in the year 1860.

	Population.	Deaths.					Date of first Case.	Date of last Case.
		Men.	Women.	Boys.	Girls.	Total.		
Gopalghur ...	49,131	326	154	160	139	779	26th April	26th June
Paharie ...	26,000	93	62	37	23	215	4th May	,, ,,
Rama ...	34,000	111	47	61	50	269	5th ,,	,, ,,
Bunsawr ...	......	68	33	53	22	176	10th ,,	30th ,,
Deig ...	......	65	13	21	15	144	15th ,,	26th ,,
Oochein ...	......	20	14	12	16	62	15th ,,	— June.
Byana ...	......	55	35	36	28	148	15th ,,	,,
Wier ...	... ..	10	3	3	5	21	28th ,,	25th July
Bhurtpore City	57,000	106	71	57	42	276	5th June	25th Aug.
,, District	......	28	7	17	12	64	5th ,,	,,
Nuggur ...	......	41	23	25	14	103	6th ,,	25th July
Kombher ...	......	39	26	29	19	113	6th ,,	26th ,,
Roopkhas ...	......	2	1	1	1	5	6th ,,	30th ,,

NUSEERABAD AND AJMERE.

In the foregoing account, the outbreak of Cholera among the European Troops at Nuseerabad has been briefly noticed.

This station, which has been generally considered particularly healthy for European Soldiers, is situated about 15 miles to the south-east of Ajmere, the Head Quarters of the Agent to the Governor General for the States of Rajpootana.

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The following Table shows the strength of the European Force at Nuseerabad at the commencement of the Epidemic, and the cases of Cholera that occurred :—

REGIMENT.	STRENGTH.			CASES OF CHOLERA.						PERCENTAGE.								
				Men.		Women.		Children.		Cases to whole Strength.			Deaths to whole Strength.			Deaths to Cases.		
	Men.	Women.	Children.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Men.	Women.	Children.	Men.	Women.	Children.	Men.	Women.	Children.
H. M.'s 28th Regiment ...	891	65	99	25	20	8	7	4	4	2·8	12·3	4·0	2·2	10·8	4·0	80·0	87·5	100·0
3rd Troop Bombay Horse Artillery ...	114	12	12	4	...	1	1	1	...	3·5	8·3	8·3	...	8·3	...	...	100·0	...
H. M.'s 3rd Dragoon Guards, Left Wing ...	238	14	11	15	10	4	4	...	...	6·3	28·6	...	4·2	28·6	...	66·7	100·0	...
Total ...	1,243	91	122	44	30	13	12	5	4	3·5	14·3	4·1	2·4	13·2	3·3	68·2	92·3	80·0

The first case of Cholera in Her Majesty's 28th Regiment occurred on the 15th July. The Epidemic reached its climax during the first week in August, and the last case occurred on the 29th August.

The following account of the accommodation provided for a portion of the Troops, and of the circumstances connected with the progress of Cholera at Nuseerabad, is taken from the Report of Dr. Marlow, Surgeon of the 28th Regiment:—

"There is ample barrack accommodation for the married Soldiers, and their quarters are in good repair. But it may here be remarked that, during the Epidemic of Cholera at Nuseerabad in July and August last, as it appeared in the 28th Regiment, the number of attacks amongst the married people inhabiting the Patcherees* was very remarkable. Out of 36 cases of genuine Spasmodic Cholera, five men, seven women, and three children were seized in the Patcherees. Of these all died, with the exception of one man and one woman. The sanitary condition of these buildings had always been considered satisfactory, and there is now apparently nothing to object to, except perhaps the situation of the Regimental Bazar (in which, however, not a single case of the disease occurred) rather close to one of the buildings on the east.

"The prevailing winds are westerly during nearly eight months of the year, and sweep over clear plains from the foot of the Aravulli range of hills, distant about four or five miles.

"The buildings, eight in number, are in three parallel lines running north and south, but so disposed as not to interfere with ventilation. They are all new, built of stone, tiled, with stone floors raised well above the level outside. On the north and east, in close proximity, are the lines of the Native Cavalry Regiment, in which very few cases of Cholera occurred; on the south are the barracks in a line with the Patcherees. To the east, with the exception of the Regimental Bazar above mentioned, there is open ground. Each married Soldier occupies one compartment of the ten contained in every building, and each family has a cubic space of 3,358 feet. There is a verandah common to all on the western aspect or front of each building; at the back the compartments are separated by walls from those on either side, and each has a small apartment intended for a bath-room. The kitchens are contained in separate buildings, but strangely enough under the same roof as the necessaries. These out-offices are for the most part to leeward with respect to the prevailing winds. There is one urinal under the same roof with each latrine, and there are covered cess-pools for the urine, which is drawn by means

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* "Patcherees."—Quarters for married people.

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of a bucket from its receptacle, and carried away in puckalies for the purpose, whenever the cess-pools become full; the solid excreta are removed daily from the latrines by the basket system. Although the sanitary state of the barracks and out-offices is as satisfactory as the nature of the buildings and the present arrangements will allow, it does not follow that improvements might not be effected. If, as has been asserted by Alison, Budd, and others, the exhalations from the excreta of Cholera patients can propagate the disease, and apparent proofs are not wanting that this has been the case, as a matter of course the present basket system in use is a very imperfect one. Even after the solid matters are supposed to have been removed, enough remains to render the leeward side of the latrines extremely offensive at all times. In Nuseerabad these disgusting odours, in combination with the foul gas which escapes from the urine cess-pools during the removal of the contents, can often be unmistakeably detected in the line of bungalows inhabited by the Officers and their families on the leeward side of the latrines for eight months in the year. During an Epidemic of bowel complaint, these noxious emanations are given off in an enormously increased degree, and although the Cholera, as it appeared in the station in July and August last, may have had its origin in atmospheric causes mainly, there may be ground for believing that local causes had something to do with its virulence, and the tenacity with which it clung to the Cantonment for a period of six weeks. Choleraic diarrhœa was very prevalent in the bungalows above mentioned, and it is a significant fact that five European Officers were attacked with Spasmodic Cholera, and four died in these lines,—a large percentage when the relative strength of men and Officers is taken into consideration. Of two European women attacked in the same locality, one only recovered. The subject deserves the most serious consideration, and although, under ordinary circumstances, the abolition of the basket system with the substitution of a liberal supply of dammered iron vessels, and the filling up of the cess-pools for urine would be an immense improvement, still, if the specific poison of Cholera can be disseminated in the way affirmed, something more becomes requisite in a country subject to nearly annual and almost always sudden visitations of this dire pest. In the Appendix to the Transactions of the Medical and Physical Society of Bombay for 1860, there are some able remarks in a paper on the sanitation of barracks, by Assisant Surgeon T. Lownds, M. D., with suggestions for the introduction of cess-pools so constructed as to confine all effluvia until the matters from which they are given off can be removed to a distance.

" There is no hospital for Her Majesty's European Infantry Regiment stationed at Nuseerabad. There is accommodation for 80 patients in

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one barrack room, and in two-thirds of another, the remaining third being partitioned off and used as a school for children. The late Epidemic of Cholera, limited as it was with regard to number attacked, was not needed to demonstrate how utterly unsuited for hospital purposes a barrack room is, except for ordinary cases, during a healthy season.

"Cholera fell upon the city of Ajmere, distant 15 miles from this Cantonment, in the early part of July; there it committed dreadful ravages among the Native population, but, strange to say, it did not attack a single European, although a Company of the 28th Regiment was stationed in the Fort which is inclosed in a part of the town. Towards the end of the Epidemic, an invalid at the Sanitarium of Taraghur fell a victim to the disease, and this was the only death among the European population near Ajmere.

"During the prevalence of the disease at Ajmere, reports of the occurrence of stray and doubtful cases in the Bazar at Nuseerabad were circulated, but, whether or not, a case really occurred in the 28th Regiment on the evening of the 15th July. The individual attacked was a man peculiarly subject to bowel complaint, and although the case was undoubtedly one of Cholera, he recovered, only, however, to be cut off afterwards by a second attack when the Epidemic really invaded the Cantonment. During the fortnight which followed this case, there were no more. But nearly every resident in camp complained of a great mental and bodily oppression, coupled with an inability to digest food, a sensation of weight in the epigastrium, and a feeling of prostration which induced a craving for stimulants even in the most temperate. These symptoms were assuredly not the result of mere mental alarm at the proximity of such a terrible pestilence, although a feeling of dread did prevail amongst the men, but probably arose from the remarkable sultriness of the atmosphere, which undoubtedly was the forerunner and accompaniment, if not intimately connected with the cause of the Epidemic itself.

"Preparations and precautions against the advent of the disease in camp were in the mean time made.

"At the northern end of the Cantonment, on the road to Ajmere, was stationed a Wing of the 3rd Dragoon Guards, and the disease appeared among the men in a very fatal form during the last few days of July. Between the two European Corps was stationed the 1st Bombay Lancers, and leaping over this Regiment the disease attacked the 28th Regiment on the 30th July, to which it clung, as well as to the Dragoons, upwards of three weeks, and to the station generally about six weeks.

"Adjoining the 28th Regiment was a Troop of Horse Artillery, and beyond them the 12th Regiment Bombay N. I. The disease now almost

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entirely passed the Artillery and attacked the Native Regiment, but not until towards the close of its career. The general course of the Epidemic through the Cantonment was therefore from north to south, but it will be remarked how curiously it almost entirely passed over two Regiments and attacked the centre and flank Corps.

"Indeed the course of the Epidemic in these parts was most eccentric and unaccountable ; for while the Europeans in Ajmere entirely escaped, when the Natives were being smitten down in scores, the Natives living in the stifling houses and filthy purlieus of the Bazar in Nuseerabad enjoyed a remarkable immunity, while the disease clung to the lines of the Europeans in its most irresistible and fatal form.

"It is a curious circumstance that on the 12th of August, which was about the very height of the Epidemic, three European Officers were seized and died within a few hours of each other, but the bungalows occupied by these men were situated, one in the very centre, and the others at each end of a camp upwards of two miles in length, and being thus as far apart as possible. Nothing existed in the bungalows to account for this, but it so happened that the Officers themselves were men of weakly constitution, and likely to fall victims to the disease.

"Explanations why the European Artillery almost wholly escaped, while the European Cavalry and Infantry were severely smitten, may be sought for * * ; but is the fact of their immunity a whit more explicable than that of the Native Lancers, upon whom the disease scarcely touched, while it attacked the Native Infantry men of the same race, habits, and mode of living? Nor does the locality of the barracks and houses occupied by the various Corps in camp furnish a clue; all are in a line with each other; all about the same level; all equally exposed to the prevailing west wind sweeping across a wide plain; the surface drainage is the same to all; all frequent the same Bazars, and, as far as the Europeans are concerned, the same rations of meat, and drink, and water, are furnished to each."

Four of the twenty-five cases among the men of the 28th Regiment occurred among the patients in hospital under treatment for other diseases.

In the Artillery the first case was admitted on the 31st July, and the last case on the 26th August. Among the men, women, and children there were altogether six cases, and only one of these proved fatal.

No further details could be obtained regarding the outbreak of Cholera in Her Majesty's 3rd Dragoon Guards.

Two Officers of the 3rd Dragoon Guards died from Cholera on the 12th August, and an Officer of the Invalid Establishment died on the same day. There were also two cases of Cholera among the Officers of the 28th Regiment, and one of these was fatal.

Two Native Regiments were stationed at Nuseerabad. In the 1st Bombay Regiment of Light Cavalry, 234 strong, only one man was attacked, and he recovered. In the 12th Regiment Bombay N. I., nearly 700 strong, there were 12 cases; the number of deaths is not stated.

In the Sudder Bazar, which is said to have contained a Native population of more than 15,000, 126 cases and 46 deaths are reported to have occurred.

A few more particulars may be given regarding the disease in the city of Ajmere. The first case of Cholera occurred in the Jail on the 6th July. The prisoners were immediately sent into camp, with apparently much advantage, and there were only three fatal cases among them. The disease appeared in the city of Ajmere about the 15th July, and lasted until the end of August. The mortality is said to have been very great, and this may be supposed to be true, since no less than 593 cases, of which 248 were fatal, were treated at the Government Dispensary alone. The population of the town is about 25,000. In the Native Regiment stationed at Ajmere, more than 700 strong, there were only two fatal cases.

There were about eighty European Soldiers, belonging to the 28th Regiment, in the Fort of Ajmere, which is close to the city. Only one man was attacked, and the case was apparently hardly one of true Cholera.

A small Sanitarium has been established on the hill in the vicinity of Ajmere, called Taraghur, which rises on the north-east side to a height of about 1,100 feet above the plain, and 2,800 feet above the sea. The only case of Cholera which occurred here is said to have had undoubtedly its origin in the plain below. Dr. T. Murray, the Civil Surgeon of Ajmere, states that "a very favorable opinion has been formed of Taraghur as a Sanitarium."

MYNPOOREE AND ETAH.

The Districts of Mynpooree* and Etah lie to the east and north-east of Agra. They contain no stations for European Troops.

Cholera appeared at Etah on the 5th June. "It was next reported at Sirpoora, 14 miles north-east of Etah, on the 16th June, and at

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* Area 2,020 square miles. Population 832,700.

Soron, a distance of 24 miles north-west, on the 11th July. It visited Budmas, distant 12 miles west, and Kadirgunj, 28 miles north, on the confines of the District in those directions, on the 1st August. It had disappeared entirely from the south-east of the District by the middle of August, and from the west by the end of that month, but cases continued to be reported by the Police at Kadirgunj till the 12th September."*

There is no information regarding the total mortality in the Etah District, but the disease was apparently not very fatal.

Cholera appeared in the town of Mynpooree, which contains about 20,000 inhabitants, early in June, but there were very few cases, and although the disease was heard of in many parts of the District, it was no where at all virulent. Cholera can indeed hardly be considered to have prevailed epidemically in the Mynpooree District. There was only one case of Cholera in the Jail.

FUTTEHGURH.

East from Mynpooree lies the District of Furruckabad.† The city of Furruckabad, with the Military Cantonment and Civil station of Futtehgurh, are situated on the right bank of the Ganges. The city contained, according to the census of 1853, 78,000 inhabitants, and the Cantonments and Civil lines in the adjoining station of Futtehgurh contained 22,000.

Cholera is said to have commenced in the southern portion of the District in the beginning of July, but we have no detailed information regarding its first outbreak or subsequent progress. It appeared at Futtehgurh on the 15th July, and continued there and in the city of Furruckabad until the end of August. During these two months 1,950 cases are reported to have occurred in the city, of which 758 were fatal. No authentic information was obtained regarding the mortality in other parts of the District, but the Epidemic was apparently more fatal than in most of the neighbouring Districts.

There was a severe outbreak of Cholera in the Jail at Futtehgurh. The average daily number of prisoners during the Epidemic was 480. The first case occurred on the 23rd July, and the disease continued to increase in virulence up to the end of the month. On the 2nd August, the prisoners were removed into camp to a distance of about a mile. Dr. Plank, the Civil Surgeon, considered the results of the change to be

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* Report of Civil Surgeon.

† Area 2,123 square miles. Population 1,064,000.

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certainly beneficial. Eleven cases of Cholera occurred among the prisoners in camp, and the last case was admitted on the 11th August. There were altogether 60 cases and 22 deaths. The percentage of cases to strength was 12·5; of deaths to strength 4·6; and of deaths to cases 36·6.

The arrangements made by Dr. Plank for the treatment of Cholera patients in the Jail Hospital were excellent. The following account of the measures which he adopted is taken from his Report. The system which he followed was evidently correct, and without attention to the general principles upon which it was founded, no hospital management can be satisfactory during the prevalence of Epidemic Cholera :—

" In regard to the treatment," writes Dr. Plank, " of those attacked with Cholera, the great object kept in view was to scatter them as much as possible. It has been my lot to have seen and worked in four Cholera Epidemics; one, in 1849, at Camberwell, in London; the second, in 1853, at Guy's hospital, in London; the third, in 1856, at Dinapore; the fourth, in 1861, at Futtehgurh. During the three first periods I had ample opportunities of witnessing the horrors of a Cholera ward, with its long lines of death-stricken men in all stages of the disease, and I am persuaded that no more unhappy arrangement can be devised for all parties than that of crowding men sick of this disease into one large room. It is bad for the patients, who observe each other's painful symptoms with sickening dread; it is bad for the attendants, for every one with experience of the matter knows the peculiar smell of a Cholera ward, and thus has proof that the air is loaded with something which it must be dangerous to inhale; it is bad for the Medical attendant, whose mind, distracted by the dying throes of the patient in the next bed, cannot lend itself with an earnest undivided attention to the case in hand, may be one of a man showing symptoms of recovery from collapse, and whose next dose of medicine, or altered form of treatment, will perhaps bring him back to life again.

" When the first case of Cholera occurred in the Jail, four separate hospitals were established in or about the Jail at some distance apart and quite out of sight of each other. The first of these was the ordinary Jail Hospital, a brick building with good ventilation at both sides and in the roof; the other three were simply Soldiers' tents, in which charpoys were placed. When a man was brought suffering with Cholera, his case was carefully considered, and if it was apparent that he was nearly sure to die, he was admitted to No. 1 hospital. If, from the robustness of his constitution, or the less severity of his symptoms, his case could be looked on favorably or hopefully, he was sent to No. 2

hospital. If any patient showed the slightest symptom of amendment, he was immediately carried upon his charpoy to No. 3 hospital; and every patient in No. 2 hospital, found progressing towards fatal collapse, was that instant removed to No. 1. All patients from Nos. 2 and 3, who, having recovered from Cholera, yet showed symptoms of general debility, or of disorder of the intestines from the returning bilious evacuations, or of approaching secondary fever, were removed to No. 4 hospital. As far as my own feelings as a Medical man go, I know that at the time the disease was raging, I felt pleased with this arrangement; that after visiting those whom I knew were so soon to die, it was a real pleasure to step away and observe my hopeful patients, and I am sure if any of my fellow-workmen, in future times of anxiety, will adopt this weeding process, they will feel they have the disease as it were more under control, and that having cared for the comfort of those that must die, they are able to bring themselves collectedly in another place to the study and treatment of the cases that may live.

" In the Jail no difficulty was experienced in getting other prisoners to attend upon the sick, the indulgence of a certain amount of tobacco for smoking bringing forward numerous applicants for this employment. In some instances also, the friends or relations of those seized, on hearing outside of their dangerous condition, applied earnestly to be allowed to nurse their sick brethren, and were permitted to do so."

The station of Futtehgurh has been generally healthy. The water is said to be excellent, and the supply is abundant. The drainage appears to be, upon the whole, satisfactory. The barracks are temporary buildings, of very indifferent construction. Each of them contains two large rooms, 43 feet long by 24 feet broad, and 20 feet high. There is a dining room in the centre, measuring 22 feet by 24 feet, and a verandah on both sides. The roofs are thatched. The buildings were intended each to hold 32 men, and this was about the number actually living in them when the Cholera appeared. The allowance of space per man is 1,548 cubic feet and 65 superficial feet.

The Infantry and Artillery Hospitals are placed in a large house, built in the English style, divided into a number of rooms of various dimensions. The ventilation is not good, and the building is not adapted for the purposes of a hospital. The allowance of space to each man was, however, ample, and, so far as measurements are a test, the building was never overcrowded.

In the Conservancy arrangements at Futtehgurh there is nothing specially to be noticed. The latrines are on the usual surface system, and very far from satisfactory.

The following Table shows the strength of the European Troops at Futtehgurh at the outbreak of Cholera, with the number of cases that occurred :—

REGIMENTS.	STRENGTH.			CASES OF CHOLERA.						PERCENTAGE.								
				Men.		Women.		Children.		Cases to whole Strength.			Deaths to whole Strength.			Deaths to Cases.		
	Men.	Women.	Children.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Men.	Women.	Children.	Men.	Women.	Children.	Men.	Women.	Children.
Royal Artillery 6-11 ...	189	13	11	1	1	...	...	...	...	0·5	...	...	0·5	...	...	100·0	...	...
Detachment H. M.'s 42nd Highlanders	256	9	17	11	4	1	1	...	...	4·3	11·1	...	1·6	11·1	...	36·3	100·0	...
Total ...	445	22	28	12	5	1	1	...	...	2·7	4·5	...	1·1	4·5	..	41·7	100·0	...

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A portion of the 2nd Regiment Native Infantry, 276 strong, and a Troop of the 10th Bengal Cavalry, 73 strong, were stationed at Futtehgurh. One man in the Infantry was attacked with Cholera, but recovered. There were no cases in the Native Cavalry.

The detachment of the 42nd Highlanders was sent from Bareilly to Futtehgurh in March 1861, when the Head Quarters of the Regiment marched to Agra. Previously to the attack of Cholera the general health of the men had been good, and there was nothing in their duties or habits which appeared likely to predispose them to attack of epidemic disease.

Although the cases of Cholera were not numerous in this detachment, the circumstances under which they occurred are interesting.

The first European who was attacked was the Apothecary. He was seized with Cholera in the hospital on the 4th August. He was suffering at the time from no other disease, and he recovered. On the following day there were two more cases in the hospital. Both of these were patients under treatment for syphilis. On the 6th August another patient, suffering from a syphilitic affection, was attacked, and on this day a man was also admitted from barracks, who, it was believed, had no communication with the hospital, or with other persons suffering from Cholera. On the 7th August a man was seized in the hospital, while acting as orderly in attendance on a Cholera patient.

The disease was evidently hanging about the hospital, for out of the six cases that had occurred up to this time, five had apparently had their origin there. This was observed by Dr. Hooper, who was in Medical charge of the detachment, and he wisely determined to abandon the hospital buildings altogether. He obtained six tents, which were pitched four or five hundred yards from the hospital, and into these all the patients were removed on the 7th August. A separate tent was reserved for confirmed cases of Cholera, and another for cases in which symptoms were present which might prove to be premonitory of the disease.

After this there were no more cases among the hospital patients, except one in the camp on the 13th August, and until the 12th August there were no more admissions from the men in barracks. On this day the greater number of the men were moved into tents, on the parade ground, to a distance of a few hundred yards from the barracks, and two cases of Cholera occurred in the camp on the same day. Another man was attacked on the 14th August, but none of the three cases after moving into tents proved fatal. On the 13th August a patient under treatment for dysentery in the Camp Hospital was attacked with Cholera and died.

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After this there was only one more case among the men. On the 17th a man who was employed as orderly was attacked in the Camp Hospital and died. On the same day a woman was seized with Cholera in the barracks. This was the only case that occurred among the women. The children escaped altogether.

The average healthy strength per diem during the prevalence of the Epidemic, from the 5th to the 18th August, was 239. The average daily number of patients in hospital with other diseases than Cholera during the same time was 16.

The cases were distributed as follows :—

	Cases.	Deaths.
Admitted from healthy strength	4	...
,, from patients in hospital with other diseases ...	4	3
,, from men employed on hospital duty ...	3	1

The percentage of cases to healthy strength was therefore 1·7, and among them there were no deaths, while among the hospital patients 25 per cent. were attacked and 18·7 per cent. died.

The percentage of deaths to cases was as follows :—

In cases admitted from healthy strength	0·0
,, from patients in hospital with other diseases ...	75·0
,, from men employed on hospital duty	33·3

Thus every fatal case that occurred was, in one way or other, connected with the hospital.

Dr. Hooper's arrangements were altogether very judicious. The system which he adopted was the same in principle as that which has been described in the report by Dr. Plank, which has been quoted above. Cholera among the Native population was unusually virulent at Futtehgurh, and it is probable that it would have been more fatal among the European Soldiers had the Medical arrangements been less satisfactory.

It was not only in the system of hospital management that Dr. Hooper's measures were judicious. Every care was taken for the inspection of the men, and for the treatment of premonitory symptoms out of the hospital. He was also most successful in another very important matter. No orderlies were sent into the hospital according to the ordinary custom to attend on Cholera patients. The duties of the few Europeans who were employed were confined to the superintendence of Natives, who were specially entertained for the purpose. No difficulty was found in obtaining Native servants for rubbing the limbs of the patients or performing all other necessary services. Dr. Hooper was of opinion that the Native did the work very well, and that the European Soldiers showed no sort of dislike to them.

One of the subordinate Medical Officers was attacked with Cholera, and there was one case among the Native Medical Hospital Establishment.

Among the Artillery at Futtehgurh there was one case of Cholera. This occurred on the 12th August, and was admitted from the barracks. The patients in the Artillery Hospital were moved into tents with those of the 42nd Highlanders on the 7th August. There were no cases of Cholera among them. No explanation can be given of the fact that while the hospital patients in the 42nd were suffering severely, those of the Artillery in the same building escaped altogether.

No European Officers were attacked with Cholera at Futtehgurh.

ETAWAH.

The District of Etawah* lies upon the left bank of the Jumna, south of Mynpooree and Furruckabad.

There are no European Troops in this District.

The Reports of Dr. Raddock, the Civil Surgeon, state that the first case of Cholera in the town of Etawah† was reported on the 14th June. On the 3rd and 19th July there were two more cases. The first man attacked was a religious mendicant, who was said to have lately come from Bundelkhund; the second was brought in from a village on the Futtehgurh road; the third was a man who had just arrived from Allahabad with some prisoners. These are said to have been the only cases in the town of Etawah until the 3rd August, when Cholera broke out in an epidemic form. There is no information of the total mortality that occurred, but it was apparently not great. The disease reached its height in the town between the 20th and 26th August. In the adjoining Civil station, a European child was attacked on the 20th September. In the 5th Regiment Native Infantry, which was stationed at Etawah, there were no cases, nor there were any in the Jail. The following are given as the dates upon which Cholera appeared in various places in the Etawah District: Sandows, at the south-west extremity of the District, 20th July; Bhind, (Gwalior territory,) a few days earlier;

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* Area 1,677 square miles; population 611,000.

† Population 23,000.

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Niware-khoord, 11th August to 22nd September; Beaspoor and Tundwa, 10th to 30th September; Bilowna, 14th to 30th September; Peepreepoor, 22nd to 26th September; Bheekunpoor, 21st to 29th September.

The number of deaths is not known; but, although the disease appears to have been common in many parts of the District, it was apparently not very fatal.

CAWNPOOR.

The District of Cawnpoor* lies to the south-east of Furruckabad and Etawah. Cholera was not very prevalent in this District during the Epidemic, but cases were common as early as the month of April. The disease has become endemic in the city of Cawnpoor, and it is said that no hot season passes in which it is not more or less virulent among the Native population.

About the middle of May, Cholera occurred in a decidedly epidemic form in the city, and towards the end of the month it was very fatal. Its virulence diminished early in June, but it continued to be prevalent during the rest of this and the two following months. There are no means of ascertaining the actual mortality that occurred in the city, but the number of deaths was estimated by the Civil Surgeon, from the best information which he could obtain, at about 600. The population, according to the last census, exceeded 100,000.

There were only three cases of Cholera, none of them fatal, among the prisoners in the Jail, although its sanitary condition is stated to have been unsatisfactory. These cases occurred in the first fortnight of June.

In the 17th Regiment of Bengal Native Cavalry, which was stationed at Cawnpoor, there were 16 admissions, and 6 deaths, between the 9th May and 23rd August. Of these cases, 13 occurred between the 22nd May and 6th June.

The Returns and Reports supplied from this station were defective, and the account of the Epidemic among the European Troops is very imperfect.

Cawnpoor has long borne a bad reputation for healthiness, and the mortality among the European Soldiers has always been high. Before the mutinies, the sanitary condition of the station appears to have been very bad. Since 1858 new ground has been occupied for the Cantonment, and a fine range of barracks has been built; some of these are double-storied buildings. Both in construction and situation the new

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* Area 2,348 square miles; population 175,000.

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barracks are very superior to the old ones. The site chosen has been objected to by some authorities, but the principal faults which have been pointed out may apparently be remedied with no great difficulty. The drainage is very defective, and its improvement is urgently required. The latrines attached to the barracks and hospital were bad in construction and offensive in the extreme. Nothing could be more unsatisfactory than their state.

The following Table shows the strength of the European Troops stationed at Cawnpoor in April 1861, and the cases of Cholera that occurred during the prevalence of the Epidemic :—

REGIMENT.	STRENGTH.			CASES OF CHOLERA.						PERCENTAGE.								
				Men.		Women.		Children.		Cases to whole Strength.			Deaths to whole Strength.			Deaths to Cases.		
	Men.	Women.	Children.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Men.	Women.	Children.	Men.	Women.	Children.	Men.	Women.	Children.
H. M.'s 54th Regiment	947	50	64	37	24	5	3	2	1	3·9	10·0	3·1	2·5	6·0	1·5	64·9	60·0	50.0
19th Dragoons...	220	19	19	10	7	...	...	...	...	4·5	...	...	3·2	...	...	70·0	...	...
Bengal Artillery, 2nd Company, 3rd Battery	83	14	10	1	1	...	...	...	...	1·2	...	...	1·2	...	...	100·0	...	...
Total ...	1250	83	93	48	32	5	3	2	1	3·8	6·0	2·2	2·6	3·6	1·1	66·7	60·0	50·0

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On the 2nd April the first case occurred among the European Troops. On this day a man of the 34th Regiment was attacked, on the journey from Allahabad by Railway, and died shortly after his arrival at Cawnpoor. On the 5th April the wife of a man of the 71st Regiment, who had come by Railway with her husband from Allahabad a few days before, was attacked and died; and on the 8th April the man was also seized with Cholera and died. Nothing has been ascertained which serves to explain the attack of these persons. It was supposed by many that they introduced the disease from Allahabad to Cawnpoor, but at this time there was apparently no greater prevalence of Cholera at the former than at the latter station.

On the 8th April a woman belonging to the 54th Regiment was attacked and died, and on the 10th and 12th April there were two more cases, one in a child belonging to the 7th Regiment, and the other a woman in the 54th.

One of the European residents was attacked by Cholera in the Civil station on the 15th April. After this there were no cases among Europeans until the 25th May.

On this day the disease re-appeared in Her Majesty's 54th Regiment. During the last week in May there were eight cases, and during the first fortnight in June there were eight more. With the exception of one case on the 19th June, and another on the 15th July, there were no more cases until the 24th July. After this date cases occurred almost every day until the 4th August, and the disease did not disappear until the 23rd of that month. In this Regiment there were altogether 37 cases and 24 deaths. Three patients suffering from other diseases were attacked in hospital; one with dysentery, one pthisis, and one syphilis. The two first cases were fatal. No particular buildings were observed to be specially liable to attack.

In Her Majesty's 19th Light Dragoons, a man was attacked on the 28th July, and nine more cases occurred between the 4th and 21st August, when the disease ceased. No detailed information was obtained regarding the Epidemic in this Regiment.

The Artillery lost only one man.

There were no cases of Cholera among the European Officers at Cawnpoor.

OUDH.

So far as could be ascertained, Cholera did not prevail epidemically in 1861 in any part of the Province of Oudh, which is separated by the Ganges from the Districts of Cawnpoor and Furruckabad. There were, however, sporadic cases. In Lucknow a European Soldier died; and in August there were ten cases and three deaths in the Jail at Baraich.

FUTTEHPOOR AND ALLAHABAD.*

The District of Futtehpoor lies between Cawnpoor and Allahabad. Cholera is said not to have been heard of in any part of this District. This may not be strictly correct, but there is apparently no doubt that the disease did not prevail epidemically.

It has been already noticed that during the months of March and April, Cholera had assumed an epidemic character in some of the Districts of Behar and Northern Bengal, lying eastward from Allahabad. Cholera has become endemic in the District of Allahabad. There is probably no year in which the Native population of the city does not suffer, more or less severely, from the disease, and, during the past nine years, deaths from Cholera have taken place among the European inhabitants of the station in every year except 1856 and 1858. In 1859 there were 131 deaths among the Christian population of the place, and in 1860 there were 23. The disease is chiefly prevalent during the hot season and the earlier part of the rains. It appears to be generally considered that the portion of the District lying on the south side of the Jumna is more liable to the attack of Cholera than that situated to the north of the river.

The Epidemic of 1861 was preceded in the Allahabad District and city by sporadic cases during the months of March and April. Two cases occurred among Europeans. One was admitted into the General Hospital on the 29th March, and one on the following day. Neither of these cases proved fatal.

The great works on the Railway bridge across the Jumna were at this time in progress, and about 2,500 labourers were employed daily in sinking the foundations and building the piers. The bridge crosses the Jumna immediately below the city of Allahabad. The past season had been unusually dry; the river had fallen much below its ordinary level, and there was very little current. "In consequence of this," writes Dr. Irving, the Civil Surgeon of Allahabad, "an immense accumulation of putrid human bodies was collected close to the bridge, and although various expedients were adopted by the Railway and Magisterial Authorities to get rid of them, such as burning them, of towing them down to the junction of the Jumna and Ganges, where the current was stronger, yet it was found that it could not be managed. To-night the river might be clear, but by the morning others had come down and tainted the air in the most horrid manner. The wind passing over the chief accumulation of these dead bodies blew right into the north abutment, close to which numbers of coolies lived, and here the disease was most prevalent."

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* Futtehpoor, area 1,583 square miles; population 679,800.
Allahabad, area 2,788 square miles; population 1,380,000.

This was not the only cause likely to lead to the outbreak of disease. The native labourers on the bridge lived either in temporary huts or in the open air, in the dry bed of the river, or on the banks close by. The suburbs of the city in the vicinity are thickly inhabited, mostly by people of the poorer classes, and as no sanitary precautions or measures of conservancy worth notice had been adopted, the dry bed of the Jumna became the receptacle for every sort of filth. No language can exaggerate the disgusting condition which, under such circumstances as these, the bed of an Indian river very frequently assumes. Nothing could have been worse than the state of the bed of the Jumna at this time. It had become to all intents and purposes one huge latrine. No conditions could have been more favorable for encouraging the attack of the Epidemic which was impending.

On the night between the 10th and 11th May Cholera broke out with great virulence among the coolies at the Jumna bridge. Thirty deaths occurred on the first day. There was a Native Doctor at the works, but he could do very little. Nearly every one died who was attacked. After the first day a panic seized the people at the bridge, and large numbers of them fled away to their homes. From the 11th to the 20th May 144 deaths were ascertained to have occurred. But the Chief Engineer, Mr Sibley, stated that he feared that these numbers "represent but a small proportion of the mortality due to the Epidemic; as from the evening of the first day, large numbers left the works for their homes, and were afterwards heard of as having died at their villages "or on the road to them."* The greatest mortality seems to have occurred on the north bank. Th[illegible] number of workmen on each side of the river was about the same.

A few days after the outbreak of Cholera at the bridge, the disease was heard of in the adjoining suburbs, and shortly afterwards it attacked the city of Allahabad itself. There are no Returns to show the actual mortality that occurred. The Magistrate estimated the number of deaths at about 700, but Dr. Irving considered this to be probably much below the truth. The principal mortality apparently occurred during the latter part of May and in the beginning of June. The population of Allahabad, according to the last census, was about 72,000.

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* Quoted from the Civil Surgeon's Report.

On the 11th May, some hours after the first outbreak of Cholera at the bridge, the disease appeared in the new Central Prison in course of erection on the south side of the Jumna, about three-quarters of a mile from the river. Dr. Jackson, Superintendent of the Prison, states that he closely investigated the circumstances attending the first cases that occurred, and the following account is taken from his Report:—"A gang of prisoners is daily employed in conveying provisions from the old to the new Jail; and the river, in this daily task, is crossed at the point at which the Railway coolies are at work. On the 11th May, the day after the coolies were attacked with Cholera, one of the Burkundazes in charge of a gang of prisoners who had gone to the Jumna, was seized and brought back to the temporary Jail enclosure. A prisoner, who was employed in cooking within the enclosure walls, hearing of this, left his work and came to the Burkundaz as he was lying at the gate. In a very short time he also was attacked. The third man who was seized with Cholera could also be traced to have been in the immediate vicinity of the affected coolies. The disease then spread indiscriminately among the prisoners employed Trans-Jumna. The stricken patients were conveyed to the Jail hospital on this (the north) side of the river, but although the opportunities for the spread of the disease by contagion were greater among the prisoners confined in the old Jail than those employed in the open air in the new Jail, there were comparatively few cases among the former. There were 6·5 per cent. of the prisoners in the new Jail attacked; 2·18 per cent. of those in the old Jail."

The number of prisoners in the Jail was 1,670, of whom 1,025 were on the north, and 645 on the south side of the river. The total number of cases of Cholera was 66, of which 26 proved fatal. The disease appeared to reach its climax on the 26th May, when there were nine admissions and five deaths. After this the number of cases rapidly diminished. There was a second outbreak of the disease in July, which will be noticed further on.

The 12th Regiment of Native Infantry, 490 strong, was stationed at Allahabad.

On the 18th May a Sepoy of this Regiment was attacked by Cholera in the Fort. On the 23rd and 26th May two other cases occurred in Cantonments. These three cases were all fatal. No other cases took place among the Native Troops during the rest of the year.

Most of the buildings occupied by the Troops at Allahabad were built to serve a temporary purpose after the mutinies. Many of them

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are unfit for the occupation of European Soldiers, and it is to be hoped that the new barracks which it is proposed to erect may be completed with the least practicable delay. Although the existing buildings are very bad, they do not seem to have been over-crowded during the Epidemic.

The position that has been chosen for the proposed new barracks in the new Cantonments appears to be an excellent one, and it is likely to prove far healthier than the old Cantonments. The ground has been chosen by thoroughly competent observers, and every point of importance has been carefully studied.

There were remarkable differences both in this and in previous Epidemics in the apparent liability of the various barracks at Allahabad to the attack of Cholera. It was not possible to investigate this subject fully, but a few remarks may be made upon it, and upon the general arrangements for the accommodation of the Troops.

There are four principal blocks of building, called the Wellington, Chatham, Clydesdale, and Mansfield lines. The Wellington barracks, eight in number, occupy the northern end of the station. These have been more exempt from Cholera than any other barracks at Allahabad. During the Epidemic of 1861 they were occupied by the Bengal Artillery, and only one case of Cholera occurred in them. In the severe Epidemic of 1859, the Bengal Artillery occupied the same quarters, and on that occasion also they wholly escaped the disease. Dr. Beatson, the Officer in charge of the General Hospital at Allahabad, made the following remarks regarding this exemption :—"There is no reasonable mode, in my opinion, for accounting for this very extraordinary circumstance; the more striking because the barracks in question are really the worst situated in the whole station. The ground in their neighbourhood is low and ill-drained, being most irregular in its levels, while that adjoining the Artillery lines contains the cess-pools of that part of the station which lies east of the Church, a very large latrine, and at no great distance is the European burying ground. In a word many conditions generally considered as affecting injuriously the sanitary state of a barrack are assembled in this locality."* In his Report upon the Epidemic of 1861 at Allahabad, Dr. Beatson again refers to this subject as follows :—"The barracks are certainly not better than those which shelter the other Troops; the floors are even less raised above the level of the ground; the drainage is necessarily imperfect, because the ground has an actual fall towards the barracks; there is a jheel about

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* Report on Cholera at Allahabad in 1859.

350 yards in circumference, not more than 50 yards from the nearest barrack; high growing crops are cultivated within 300 yards of the lines; the grave yard is not a quarter of a mile off; the stables almost touch the lines; a tope of mango trees in which it stands must interfere with the ventilation of the principal barrack; and yet, notwithstanding all these unfavorable conditions, here is the healthiest barrack in the whole Cantonment, which has escaped not in one outbreak of Cholera only, but in three separate visitations."

The Horse Artillery Barracks, two in number, are about 200 yards to the south-east of the Wellington lines. They have enjoyed the same immunity to the attack of Cholera. They have the advantage of some clumps of fine trees, which afford an agreeable shade.

The Chatham barracks lie to the west of the Wellington lines. They are chiefly occupied at present by the depôt, the General Hospital, and quarters for married people. A considerable number of cases of Cholera occurred in these buildings.

The latrines and urinaries could hardly be worse. Their condition was offensive to the last degree.

The Clydesdale barracks, ten in number, were occupied during the Epidemic by the 90th Regiment. A few cases only of Cholera were admitted from them. The buildings occupied as the hospital of the 90th Regiment are situated further to the south, near the extremity of the Infantry lines between the Clydesdale and Mansfield barracks. The hospital patients suffered very severely during the Epidemic.

The Mansfield lines consist of ten barracks, situated to the west of the Clydesdale line. Five of these buildings are separated from the other five by a road with an avenue of trees. The barracks on the north side of the road have an open space on the north, stretching for several miles, with hardly a single tree, to the low land on the bank of the Jumna. These five barracks have always, it is said, in former Epidemics, suffered severely, while the five barracks on the other side of the road have almost entirely escaped. This occurred, to a remarkable degree, in 1859, when the 5th Fusiliers occupied these lines. Some observers explain this difference by the supposition that the buildings on the south of the road have been protected by the presence of the numerous trees that lie between them and the prevailing winds. Whatever may be the truth of this idea, there is no doubt that well-wooded localities have often suffered less severely from Cholera than those that are devoid of trees. During the late Epidemic the Mansfield lines were not occupied.

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The conservancy arrangements connected with the barracks and hospitals at Allahabad were very unsatisfactory. The latrines and urinaries were generally worse, if possible, than at the other stations that were visited. There can be no doubt that, at places like Allahabad, where Cholera has become endemic, this is a matter of the greatest importance, and that measures are doubly necessary for the maintenance ot the buildings and of the station generally in a good sanitary condition.

The health of the Troops was generally good before the appearance of Cholera, but during May and June cases of diarrhœa became numerous.

MINISTRY OF CULTURE · GOVERNMENT OF INDIA
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The following Table shows the strength of the European Troops at Allahabad when the Cholera commenced, and the number of cases that occurred:—

REGIMENT.	STRENGTH.			CASES OF CHOLERA.						PERCENTAGE.								
				Men.		Women.		Children.		Cases to whole Strength.			Deaths to whole Strength.			Deaths to Cases.		
	Men.	Women.	Children.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Men.	Women.	Children.	Men.	Women.	Children.	Men.	Women.	Children.
Her Majesty's 90th Regiment ...	988	29	31	29	19	1	1	2	2	2·9	3·4	3·2	1·9	3·4	3·2	65·5	100·0	100·0
Royal Artillery, 4th Battery, 14th Brigade	187	12	13	3	2	...	...	...	...	1·6	...	...	1·1	...	...	66·7	...	...
Bengal Horse Artillery, 2nd Troop, 2nd Brigade	95	17	18	1	1	...	...	...	...	1·1	...	...	1·1	...	...	100·0	...	...
Total ...	1270	58	62	33	22	1	1	2	2	2·6	1·7	3·2	1·7	1·7	3·2	66·7	100·0	100·0

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On the night of the 19th May, two men of the 90th Regiment, stationed in the Fort, were attacked with Cholera. They both died within twelve hours. No other cases occurred in the Fort while the Epidemic lasted, except one on the 4th June.

On the 23rd May the disease appeared in the quarters of the married men of the Regiment. A child was attacked, and died in a few hours. On the same day a case occurred in the Clydesdale barracks, and on the 25th May another was admitted from the same place. On the 28th May the mother of the child who had died on the 23rd was attacked in the married quarters. On the same day one of the Officers of the Regiment was seized with the disease. Both these cases proved fatal within twelve hours. After this there were no cases until the 3rd June, when a man was attacked, who lived in the room next to that in which the disease first appeared in the married quarters.

Dr. Lapsley, the Surgeon of the Regiment, makes the following report of the sanitary state of this part of Cantonments :—"I attributed the appearance of Cholera in the married people's quarters to an offensive latrine, situated about 200 yards to the windward of these quarters, and just outside the western boundary of the Cantonments. I found cart-loads of human ordure and filth of every description lying exposed to the sun on a large surface, the stench from which was felt not only by the married people, but by the men occupying the Clydesdale barracks, 400 yards further off, when the wind blew from the westward, which it usually did about this time." Dr. Lapsley, therefore, recommended the removal of the married people from their quarters. This was immediately done, and no more cases occurred among them. On the following day, the 4th June, another case was admitted from the Fort. This was of a milder type, and out of the nine cases that had occurred this was the only one that recovered. There was no more Cholera in the Regiment after this, until the disease re-appeared in the station in July.

During May and June there were no cases of Cholera among the Artillery.

One case was admitted into the General Hospital on the 23rd May.

It will be seen from the foregoing account that the Epidemic spread rapidly through the station after its outbreak, on the 11th May, at the Jumna bridge; it reached its climax both among Europeans and Natives between the 18th and 28th May, and it nearly ceased after the first week in June.

On the 14th July the disease re-appeared in the Jail, and between that date and the 1st August seven cases occurred among the prisoners.

On the 17th July a case of Cholera occurred in the Clydesdale barracks occupied by the 90th Regiment. On the 18th a case was admitted into the General Hospital. On the 19th a patient who had been suffering from slight diarrhœa was attacked by Cholera in the hospital of the Bengal Horse Artillery. On the 20th and 23rd July two more cases occurred among the men of the 90th Regiment in the Clydesdale barracks. On the following day the disease became virulent in the hospital of the same Regiment. Five patients suffering from other diseases were attacked between the hours of one and four in the morning, and they all died. On the 26th July the Corporal of the Hospital Guard was attacked, and on the 27th one of the European hospital orderlies. On the 28th another patient in hospital was seized, and on this and the following day there were three cases admitted from the barracks. On the 29th July a man was attacked who had been employed on duty in the hospital. On the 30th there was another case in barracks, and two more cases among the patients in hospital. On the 31st July the hospital was abandoned. "Three days," reports Dr. Lapsley, the Surgeon of the Regiment, "after the appearance of the disease in the hospital, a Committee, consisting of the Brigadier General, Deputy Inspector General of Hospitals, and Executive Engineer, was appointed to decide upon the buildings in the Mansfield lines best suited for a hospital. Two of the most elevated buildings having been fixed upon, active measures were taken to have them put in proper repair, and whitewashed, and the ground round them cleared of rank vegetation. Everything was ready by the 31st July, and on the same day the sick were removed into them. That night a case of Cholera occurred, and another on the 3rd August, both of which ended fatally. On the 6th another case occurred in the hospital; the subject of it was a very delicate man, who had been two months in hospital, suffering from dysentery. He, however, recovered, and this was the last case met with in the Regiment."

During July and August there were altogether twenty-one cases of Cholera in the 90th Regiment, and of these only seven were admitted from the barracks. There were eleven cases among patients in hospital under treatment for other diseases, and three cases among men employed on duty in the hospital. Thus 66·7 per cent. of the whole number of cases were connected with the hospital.

If we take the whole period of the Epidemic from the commencement of the outbreak in May, we have the following comparative results :—

Average daily healthy strength	879
Average number of patients in hospital with other diseases ...	96

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	Admissions.	Deaths.	PERCENTAGE.		
			Admissions to Strength.	Deaths to Strength.	Deaths to Admissions.
Cases among healthy strength (including men on hospital duty)	18	11	2·0	1·3	61·1
Cases among patients in hospital with other diseases ...	11	8	11·4	8·3	72·7

Among the men of the Royal Artillery there were three cases; one on the 26th July, and two on the 9th August. The first case recovered; the other two were fatal. One of the men attacked on the 9th August was a patient in hospital recovering from rheumatism. The Medical Officer in charge was also attacked, but he recovered.

In the Bengal Artillery there were no cases except the one which has been already noticed.

Between the 18th July and the 18th August, when the last case occurred, there were twenty-five admissions for Cholera into the General Hospital, and of these thirteen proved fatal. Seven of the cases occurred among the patients from other diseases; one had been suffering from dysentery, two from diarrhœa, one from disease of the liver, one from intermittent fever, and two from ophthalmia.

This second outbreak of the Epidemic may be considered to have been, like the previous one, almost synchronous throughout the station; commencing about the 15th of July, it reached its climax between the 20th July and the 10th August, and it ceased in the third week of the latter month.

Among the Native population there was probably no complete cessation of Cholera between the outbreak of May and that of July.

Brigadier Rainier and Dr. Dickson, Deputy Inspector General of Hospitals, and the Military and Medical Regimental Officers, exerted themselves, during the presence of the disease, to improve the sanitary condition of the station, and to encourage every thing likely to afford healthy occupation and amusement to the men. In the 90th Regiment, the Color Sergeants were supplied with Cholera pills for distribution in the barracks, and Dr. Lapsley considered that the results of this precautionary measure were very beneficial. Similar plans were adopted by Dr. Richmond in the Bengal Artillery.

The narrative of the special circumstances under which Cholera attacked the Military stations of the North-Western Provinces and the Punjab is now concluded. Regarding the disease in the Districts lying to the south and east of Allahabad, such information has already been given as it seemed desirable to place on record.

REPORT OF THE COMMISSION.

SECTION II.

General results of the investigation, with an inquiry into the causes which have affected the progress and virulence of the Epidemic.

333. The preceding narrative contains such local details of the history of the Epidemic at each station as we were able to obtain, or it appeared desirable to place on record. In the present section of our Report, we shall have chiefly to speak of causes of general operation; of the meteorological and other phenomena which have accompanied the Epidemic; of the manner in which Cholera became diffused over so great a tract of country; of the direction of the course that it has followed; and of all the more important facts of general interest which seem to be established by our inquiries.

Relation between Epidemics of Cholera and meteorological phenomena.

334. The scientific inquiries that have been made in Europe into the influence of season and meteorological conditions upon the outbreak and progress of Epidemics of Cholera, have led to very little result.* Speaking generally, Cholera has been most prevalent in Europe in seasons of drought and heat, but the exceptions to this rule have been frequent. Thus, the disease was very fatal at Moscow and St. Petersburgh in the depth of winter; and in many places in England, during the Epidemics of 1849 and 1854, Cholera was more prevalent in the winter than in the summer. Upon the whole, however, Cholera, during the Epidemics that have occurred in England, has generally reached its climax when the temperature was high, the rain-fall very little, when the air was in a state of stagnation, and when circumstances generally tended to promote the decomposition of organic matter. No connection has been traced between the direction of the wind and the degree of intensity of Epidemics of Cholera in Europe. Much has been said regarding the absence of ozone during these outbreaks, but the

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* Of these inquiries the most minute with which we are acquainted is that of Mr. Glaisher, whose Report is published in the Appendix to the Report of the Board of Health on the Cholera Epidemic of 1854. Dr. Baly's Report, drawn up for the Royal College of Physicians (1854), also enters into the subject.

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highest Authorities appear to agree that the facts that have been ascertained are not sufficient to enable any conclusions to be based upon them.

Considering how few have been the opportunities which observers in Europe have had of investigating this subject, no other results could be anticipated, and the difficulty under which science has in this respect laboured has been greatly increased by the variable character of the meteorological phenomena of Europe.

In India, on the other hand, the natural facilities for such a study are very great. Cholera is never absent, and all meteorological phenomena occur with a regularity and intensity unknown in the temperate regions of higher latitudes.

Unfortunately, this is a branch of study which has been little followed. The available records of Cholera Epidemics on the one hand, and of meteorological phenomena on the other, are so imperfect that it is impossible for us to say much regarding this very important and interesting question.

335. Although Cholera has raged in India for more than 40 years, almost all our scientific knowledge of the disease is derived from European observation.

So too, between Calcutta and Peshawur, a distance of some 1,500 miles, through a vast tract of British territory, there is not at this moment one place where a systematic record even of Barometric pressure and of Temperature is kept. "Although," writes Colonel R. Strachey, "a large portion of the area under consideration has been more or less accessible to the British for half a century, hardly any satisfactory accounts of the climate of a single place within it yet exists; still less have we any connected series of simultaneous observations at many distant places, truly comparable with one another, from which alone a thorough insight into the general laws of climate of the whole region could be obtained."* It is a remarkable comment upon a state of things so little creditable, that the Russian Government has given us, as Colonel Strachey remarks, for Novo-Petrovsk and Raimsk, two places in Central Asia, of which most people have hardly heard the names, "meteorological records such as are hardly to be found for a single spot in the northern half of Hindoostan, hardly excepting Calcutta itself."*

336. Little as we can say regarding the actual relation which meteorological phenomena bear to Cholera in India, it is not difficult to show the extremely interesting character which the facts, so far as we can ascertain them, present.

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* Quoted from Colonel R. Strachey's still unpublished work on the Physical Geography of the Himalaya, to which we have been allowed to refer.

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Dr. Hugh M. Macpherson, of the Bengal Army, has lately given an analysis of the Mortuary Returns of Calcutta for the last 20 years.* Although the materials are very imperfect, he shows, in this excellent contribution to Medical Science, with great precision the regularity with which the mortality from various causes rises and falls according to the season of the year.

The accompanying Diagrams (A, B, C, D,) will serve to illustrate this fact more clearly than we could do by any description. They show that in Calcutta Cholera is always present. It reaches its lowest point in August, when about 150 out of every 1,000 deaths among the Native population are attributable to it. It then gradually rises through the autumn and winter, reaches its climax in April, and then again falls regularly until August. When the disease is at its highest point of intensity, it causes every year more than half of the total number of deaths. It will be observed (Diagram C) that the curves representing the mortality among the Native population for two periods of 10 years nearly coincide, and that the curve for the European inhabitants corresponds very closely with the others. When we see how uniformly these results are found to hold good through a long series of years, it is impossible to doubt that there is a real relation between the prevalence of Cholera in Calcutta and the season of the year.

This belief will be strengthened by an examination of the curves for other diseases. Thus (Diagram D,) the curve representing the distribution of deaths from all causes, exclusive of Cholera, shows that when Cholera is at its minimum, the number of deaths from all other causes among the Native population reaches its maximum. When Cholera is at its minimum, the number of deaths from dysentery and diarrhœa among Europeans reaches its maximum. The curve for small-pox, on the other hand, nearly corresponds with that for Cholera.

If reference be now made to the Diagram which shows the meteorological conditions which characterize in Calcutta the ordinary climate of the year, and this Diagram be compared with that representing the monthly variations in the mortality from Cholera, the apparent relation between the two will be seen at a glance. When the air is almost at its driest, and the temperature almost at its maximum of heat, before the commencement of the periodical rains, Cholera reaches its climax. When the rainy season is at its height, Cholera is at its lowest point, and with the diminution and cessation of the rains Cholera again increases.

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* On the Mortality of Calcutta during the 20 years ending 1860.—*Indian Annals of Medical Science*, 1862.

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337. If we compare these facts with those which hold good in the North-Western Provinces we find a most remarkable contrast, although the relation between meteorological phenomena and the disease is marked in an equally striking and interesting manner.

In the North-Western Provinces Cholera seldom prevails in the cold season, nor, except when the disease assumes an epidemic character, are cases numerous, in most Districts, at any time of the year. With the advance of the hot season, however, Cholera is frequently heard of. Its tendency to become prevalent increases from the commencement of the hot weather in April, until the periodical rains begin towards the end of June; it reaches its climax with the maximum of rain in July and August, and then falls gradually until it almost ceases in the winter. This has apparently been the rule on almost every occasion on which Cholera has raged epidemically in the north of India.

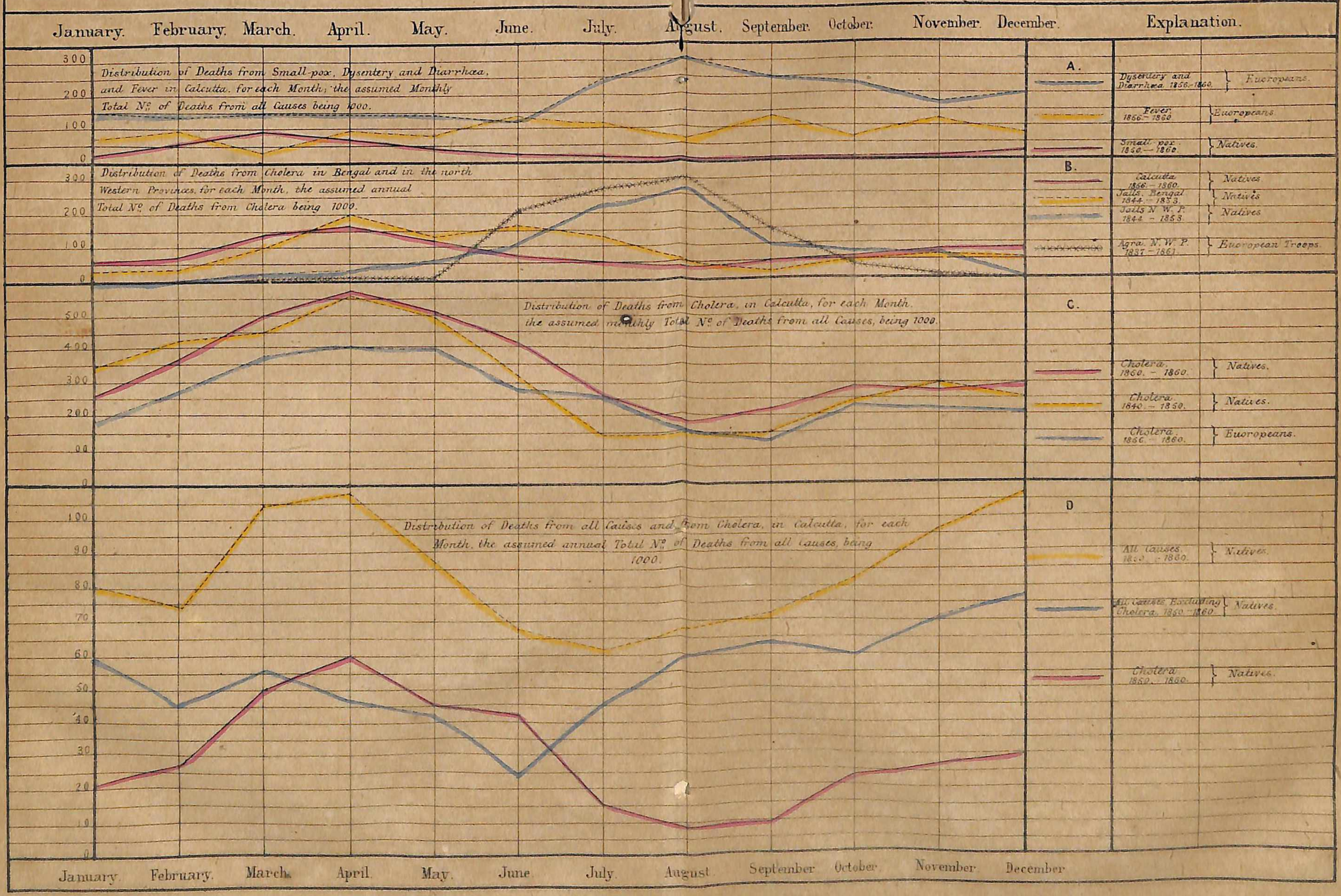
The available statistics for the North-Western Provinces are extremely imperfect, but there seems to be no doubt regarding the general facts that have now been stated. Dr. Murray, Deputy Inspector General of Hospitals at Agra, has been good enough to furnish us, from the records of his Office, with a Statement showing the mortality from Cholera among the European Troops at Agra for every month for the 25 years between 1837 and 1861. We have also examined the Jail Returns of the North-Western Provinces, and these and other sources of information leave no doubt regarding the seasons of the year which seem to encourage or to check the virulence of the disease.

In the accompanying Diagram (B), we have represented the distribution of deaths from Cholera for each month of the year among the European Troops at Agra for 25 years, and in the Jails for 10 years. It will be seen that the curves agree very closely.

The Diagram representing meteorological phenomena will serve to show at once that the apparent relation between the progress of Cholera and the season of the year is quite as well marked in the North-Western Provinces as it is in Calcutta. It will be observed how curiously the curves of Cholera correspond with those of rain-fall, of tension of vapour, of temperature, and of Barometric pressure, and how remarkable a contrast they offer to the curves for Calcutta, the disease reaching its maximum in the one case at the very time when it reaches its minimum in the other.

We have also shown in the Diagram (B) the monthly distribution of deaths from Cholera in the Jails of Bengal for 10 years. The curve generally agrees, as might have been expected, with that for Calcutta, but not entirely, for the times both of maximum and minimum intensity

DIAGRAMS to show the distribution of DEATHS from CHOLERA and other causes, in CALCUTTA and in the NORTH-WESTERN PROVINCES for each month.



occur somewhat later in the Bengal Jails. The explanation of this fact may not improbably be, that the climate of the northern parts of Bengal, in which many of the Jails are situated, approximates to that of the North-Western Provinces, and that thus the curve for the Jails represents in some degree a mean result between the other two. This explanation of the difference between the curves seems reasonable, but we have not examined the detailed Returns from which the mean results for the Jails of Bengal are derived.

338. We have said enough to indicate the extremely interesting nature of the facts which we have represented graphically in these two sheets of Diagrams. So far as our information extends, this is a branch of inquiry in which literally nothing has been accomplished, nor indeed can we find that any serious attempt has hitherto been made in India even to point out its importance. It would be difficult to find a better example of the vast practical interest of those statistics of science, the collection of which in India has hardly, up to the present time, been commenced. Although we can draw no conclusion regarding the actual nature of the relations that exist between meteorological conditions and Cholera, it is evident that those relations are real. When we consider the regularity with which the same phenomena constantly recur, and the excellence of the opportunities which exist for their observation, we cannot doubt that it is within the power of science to solve many problems regarding them, which nothing but our deliberate neglect and ignorance have suffered to remain in mystery.

339. In the facts that we have now been noticing, we have also a valuable example of the danger of hasty generalizations from data of limited extent. Observers in the North-Western Provinces, noticing the similarity,—we might almost say identity,—of the curves in these Diagrams representing Cholera, the tension of vapour, and rain-fall, through a vast extent of country, might easily be led to the conclusion that the disease was necessarily dependent upon these special atmospheric conditions. Such a conclusion would, in fact, have been evidently based not upon knowledge of the facts, but upon ignorance.

The facts that we have stated regarding Cholera in the North-Western Provinces appear to be equally applicable to the Punjab, but Cholera has been generally far less prevalent in the latter country. This at least is the conclusion which seems to be warranted by the very imperfect information that we have been able to obtain.

Regarding the apparent relations between Cholera and climate which exist in other parts of India we know almost nothing. For the Madras Presidency, our information is chiefly derived from the Reports of Dr.

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Lorimer and Dr. Balfour; but they throw little light upon this subject. In Bombay, it is stated that the Mortuary Returns show no apparent connection between the prevalence of Cholera and the season of the year. Dr. Leith says that "there are no regular annual times of maxima and minima, and in looking at the Returns of successive years, the outbreaks or exasperations of the disease, as indicated by the deaths, are seen to have taken place at apparently irregular periods."*

340. We can say very little regarding the special meteorological conditions which appear to have been present during past Epidemics of Cholera in India. If we have deprecated hasty generalization from the mean results of the observations of many years, much more is it necessary to be careful how we base conclusions upon an array of supposed facts, so desultory and doubtful as those which are available for any particular time or place to illustrate the relation between Cholera and the meteorological phenomena which were present. From an extensive series of observations, even of a most imperfect character, very valuable deductions may be derived. Mean results that may fairly be called accurate are obtainable, although the separate entries of which the Registers are made up may often represent only the roughest approximation to the truth. But this is only the case when we have a great number of observations to deal with. We can base no conclusions upon a few particular observations which we know may probably be incorrect.

341. We may give one or two practical examples of this, derived from the history of the late Epidemic.

If we take the existing Registers of rain-fall and wind for the North-Western Provinces during the past year, they will be found to represent correctly the general facts that the amount of rain was considerably above the average, and that easterly winds blew ordinarily throughout the season when Cholera was most prevalent. But if we attempt to trace the connection between any particular outbreak of the disease and the weather, we find immediately how hopeless is the attempt.

We will give, as our first example, the case of Allahabad, the seat of Government in the North-Western Provinces, and where special facilities may be supposed to exist for obtaining correct information. This, as we have shown in the preceding section of our Report, was the first place in the southern portion of these Provinces in which Cholera became epidemically prevalent. Its outbreak was curiously sudden and violent. It occurred, as we have described, among the men employed upon a great engineering work under the supervision of many European Officers, and under the immediate observation of the Medical Officers of the station.

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* Quoted from Dr. H. Macpherson's Paper on the Mortality of Calcutta.

The course which the disease followed directly afterwards was notorious, and its attack upon the European Troops soon followed. One might have supposed that circumstances could not have been more favourable for ascertaining the real facts regarding so remarkable an outbreak. In the Reports that have been furnished to us, there is no want of speculation regarding many of the most obscure phenomena of Cholera, and no want of confident assertion regarding the relation that was observed to exist between the weather and the outbreak and intensity of the disease. Yet, although each hospital has its Meteorological Register, we have found it impossible to discover with any certainty a matter so simple as that of the direction of the wind which prevailed when Cholera first appeared at Allahabad. One of the Medical Officers reports distinctly that when Cholera broke out at the Jumna Bridge, the prevailing wind was " a little south of east," and the fact is noticed as one of particular interest, in explanation of the greater mortality on the north side of the river. Another Medical Officer states with equal precision that the wind was blowing steadily from the west before, during, and for some time after the outbreak. A third Medical Officer has placed upon record that easterly winds prevailed during the time when Cholera was at its height among the European Troops. Another Medical Officer speaks of " the intimate relation that existed between the meteorological phenomena and the fluctuations of the disease. As long as the deadly west wind prevailed Cholera held its fatal grasp. If the east wind blew for a few days, there was a marked decrease in the Epidemic."

We will give one more example of the same character. On the 21st August Cholera reached its terrible climax among the Troops at Meean Meer. One of the Medical Officers reports that at this time the temperature was at its lowest and its range least. According to the Meteorological Register kept by another Medical Officer, the range of temperature on this day almost reached its maximum. In one Return, the highest temperature of the air is stated to have been 84°, in another it is stated to have been 97°. According to the Return furnished by one Officer, heavy rain fell on the 22nd and 23rd of August, while, according to another Return, there was no rain on those days at all.

342. These examples are by no means singular ones. The discrepancies which exist in different Meteorological Registers for the same station are constantly irreconcilable, and there are seldom any apparent reasons for preferring one Register to another. Little value can generally be attached to the Reports upon meteorological phenomena which accompany these Returns. We have invariably found that the Medical Officers who know the most are those who say the least upon subjects regarding which

no real data exist for true conclusions. They know that without a basis of knowledge founded upon the observation of facts, opinions regarding the laws upon which physical phenomena depend are altogether worthless.

343. The reasons will now be sufficiently understood which have induced us to say so little regarding the state of the weather at each place during the prevalence of the Epidemic, and the apparent relation between it and the fluctuations of the disease.

It must be remembered also that the European Troops, for whom alone we have generally any details of the daily progress of Cholera, formed an extremely small part of the population attacked by the Epidemic. It is true that the Europeans suffered for the most part far more severely in proportion to their numbers than the Natives, but the absolute number of cases of Cholera that occurred among them was not sufficiently large to authorize conclusions to be formed regarding the manner in which the general progress of the disease was dependent on atmospheric influences. This would have been the case even if the existing Meteorological Records had been every thing that could have been desired. We have, however, given in the Appendix to this Report such Meteorological Registers for the principal stations as we have been able to obtain, so that any one desirous of ascertaining the state of the weather at any particular time during the Epidemic will be able to obtain at least an approximate knowledge of the facts.

We have said enough to show why at the same time that we pronounce the evidence to be clear that meteorological conditions bear, in this part of India, a most important relation to the diffusion of Cholera, we enter into the discussion of no theories upon the subject. The scattered facts which we have collected cannot explain questions so complicated and so difficult; they can only serve to indicate generally the extreme importance of the facts which remain to be discovered.

344. With regard to the general conditions of the seasons which seem ordinarily to be favourable to the diffusion of Epidemics of Cholera in the North-Western Provinces and in the Punjab, and which have been characteristic of the past year, something more may, however, be said. Speaking generally, although many exceptions may be found to the rule, Cholera has been chiefly prevalent during seasons when the amount of rain was greater than usual. The most widely spread Epidemics of which we have any authentic information are those of 1845, 1852, 1856, and 1861. All of these reached their greatest virulence in the rainy season, and all of these years were distinguished by the unusual amount of the rain-fall.

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The year 1860 was a year of drought and of famine in a great portion of these Provinces. The average fall of rain in the country extending from Ghazeepoor to Saharunpoor is about 26 inches for the six months ending with October. In 1860 the total amount of rain during those months was only about 16 inches, and it fell most irregularly and capriciously. In 1861, on the other hand, the periodical rains were unusually abundant. In May the average rain-fall is less than a quarter of an inch, but in May 1861 nearly an inch of rain fell; and in the first week of June there was rain in almost every District. In the third week of June the periodical rains had become established throughout these Provinces, and up to the time of their cessation, about the middle of September, 31 inches had fallen. Of this amount, 20 inches fell in June and July, and these were the months in which the rain was so unusually heavy. In August and September, although the rain was sufficiently plentiful, its amount did not exceed that of an average year. We have no complete Returns for the Punjab, but the same general facts hold good.

345. The records of temperature have shown us nothing that requires to be specially noticed. The unusual amount of rain necessarily reduced the mean temperature of the season below that of ordinary years. The same facts show that easterly winds, which always prevail during the rainy season in the Upper Provinces, must have been even more than usually constant, and that this was actually the case, is shown by all the Registers to which we have had access.

346. We may here notice that there is a wide-spread belief that easterly winds are favourable in Northern India to the diffusion of Cholera. This belief has doubtless a basis of fact, but the apparent significance of the fact must not be misunderstood. There is no reason whatever for supposing that, independently of the season of the year, easterly winds produce deleterious effects special to themselves. When it is said that Cholera is chiefly virulent when easterly winds prevail, this is only another but less comprehensive way of stating the fact which we have pointed out, that Cholera in Northern India usually reaches its climax during the rainy season. The prevalence of east wind in the North-Western Provinces is closely connected with all other meteorological phenomena. We may again refer to the Diagram which we have given above to represent the ordinary meteorological conditions of Bengal and the Upper Provinces. If among these we could in like manner have shown the prevailing winds, they would be found to correspond exactly in the regularity of their directions with all the other meteorological phenomena of the year. Easterly winds always prevail during the

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periodical rains in Northern India; when the rains are especially heavy, the wind will be especially constant; if, as we believe to be undoubtedly the case, seasons of heavy rain are favourable to the diffusion of Cholera, it necessarily follows that seasons of Cholera will ordinarily be seasons when easterly winds are especially prevalent.

347. Although Cholera in Northern India chiefly prevails during the season of the periodical rains, it would be a great mistake to suppose that heavy rain is essential to its extensive diffusion. We need not go beyond the history of the late Epidemic for evidence of the truth of this statement. We have shown that in April and May 1861, at a time of intense drought and heat, during the season of the hot westerly winds which prevail before the commencement of the rains, Cholera was common in many parts of a vast tract between the frontiers of Sind and the Ganges. In 1860, when the failure of the rains caused a famine in the North-Western Provinces, Cholera was very fatal at Agra and Gwalior, and in other parts of the country. It would be easy to multiply examples of the same kind.

The belief is prevalent, that the liability to Epidemic attacks of Cholera in Northern India is increased not only by heavy rain, but by any irregular and unusual conditions of season, and there seems cause for believing that this is true. It appears from Dr. Hugh Macpherson's researches that the same holds good in Calcutta.

348. The remarkable relation which has been shown to exist, both in Bengal and in the North-Western Provinces, between the prevalence of Cholera and the season of the year, in no way tends to show that the disease has its origin in atmospheric causes. So far as we can judge, the facts which have been ascertained have an entirely different bearing. They seem to show that while this relation is evidently a real one, the original causes of Cholera are perfectly distinct, and that the poison of the disease, whatever it may be, has a separate existence which certain conditions of climate may aggravate or repress.

This opinion is strongly supported by the fact that in every Epidemic of Cholera which occurs, numerous places in the vicinity of places attacked by the disease escape altogether. This character of the disease is one which has been observed in every country in which Cholera has become prevalent, but its importance is especially great when we find that it holds good under circumstances so peculiar as those which exist in these parts of India, where all the phenomena of the seasons, and their apparent relations to disease, recur year after year with such constant regularity. Thus, although Cholera invariably prevails epidemically in Calcutta with excessive virulence in the hot season preceding the setting in of the periodical rains, places close by, that are clearly subject to identical atmospheric influences, escape altogether. "At Dum-Dum, for instance," writes Dr. Hugh Macpherson in the valuable paper from which we have derived so much information, "formerly the Head Quarters of the Bengal Artillery, and only seven miles distant from Government House, in most years only a few sporadic cases occur throughout the twelve months. But at times the disease breaks out with uncommon virulence, wholly irrespective of the season of the year, and when it is by no means prevalent in Calcutta. By such an Epidemic in August 1859, one-sixth of a whole detachment of Recruits with their families were carried off in ten days, the pestilence confining itself almost entirely to their barracks, and disappearing as suddenly as it had come upon us."

Little as we know regarding the manner in which Cholera depends upon the influence of season, there is apparently nothing in this respect in which it differs from other diseases. We may again refer to the preceding Diagram (A), to illustrate the manner in which different diseases reach their highest and lowest points at different times, yet with equal regularity. The curve representing the monthly variations in the mortality from small-pox is especially suggestive, not only on account of the great similarity which it possesses to the curve for Cholera, but because it shows how dependent upon the influences of season is the annual progress even of a disease in the diffusion of which contagion must be admitted to play so important a part.

Direction of progress of Cholera Epidemics.

349. The idea is a common one, that the progress of Cholera depends upon some atmospheric influence, which proceeds from place to place and from country to country in a certain fixed direction. This opinion has probably, as Dr. Baly has remarked, been caused by the erroneous notion that Cholera commonly follows a particular line in its progress through the Northern Hemisphere. "The disease," writes Dr. Baly, "has travelled from its original source towards all points of the compass: southward to Ceylon, towards the south-west as far as the Mauritius, to the Islands of the Indian Archipelago in the south-east, and to the north of China and Tartary in the north-eastern direction. In many parts, too, of its course through Asia and Europe, it has manifested its power of advancing in any direction, and within the circuit of one country in several directions at the same time. Thus, in India, the Epidemic in 1817 and 1818 seemed to radiate towards all points of the compass from its source in the Delta of the Ganges; in the year 1846, its course in Persia, Turkey, and Arabia was most singular and capricious, and in this country in 1849 its

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extension took place simultaneously from several centres and in various directions."*

350. The information that we have been able to obtain regarding the course of previous Epidemics of Cholera in Northern India is so extremely imperfect that we can say little upon the subject with any certainty; but so far as we can discover, the remarks of Dr. Baly that have just been quoted are entirely applicable to it.

Various, however, as may have been the directions in which these, like all other Epidemics of Cholera, have progressed, the fact that they are gradually diffused through the country is indisputable. Cholera, so far as our information goes, never simultaneously breaks out afresh through a great extent of country.

The notion is very common, that all these Epidemics in Northern India have their origin in Bengal, and that they travel up gradually to the North-Western Provinces and the Punjab. Considering that Cholera is always present in Bengal, and that at the commencement of the hot season it almost invariably becomes extremely prevalent, the idea is one which would very naturally arise; nor are we prepared to say that it may be altogether destitute of foundation, although the proposition, in the general form which it often takes, is certainly not correct.

351. The narrative that has been given in the first section of this Report will show that in the case of the late Epidemic, no such uniform course in one direction can in any way be traced.

Cholera appeared at Allahabad on the 11th of May. It was at the same time present in the Bhurtpoor territory, 300 miles to the north-west, while no part of the intermediate country was attacked. It was at Delhi and Meerut in the middle of June, and it did not appear in Furruckabad, 150 miles to the south-east, until the middle of July. It reached Umballa and Gwalior almost on the same day in July, although the former place is situated 300 miles further to the north-west than the latter. It attacked Lahore in the beginning of August, and about the same time it appeared epidemically in Etawah, 450 miles further south, and only 80 miles distant from Cawnpoor, where the disease was prevalent in May.

The accompanying Map illustrates the course which the disease appears to us to have followed in its progress through the country more clearly than can be shown by any description.

Leaving out of the question for the moment the outbreaks of Cholera in Allahabad and Cawnpoor, which we cannot connect with

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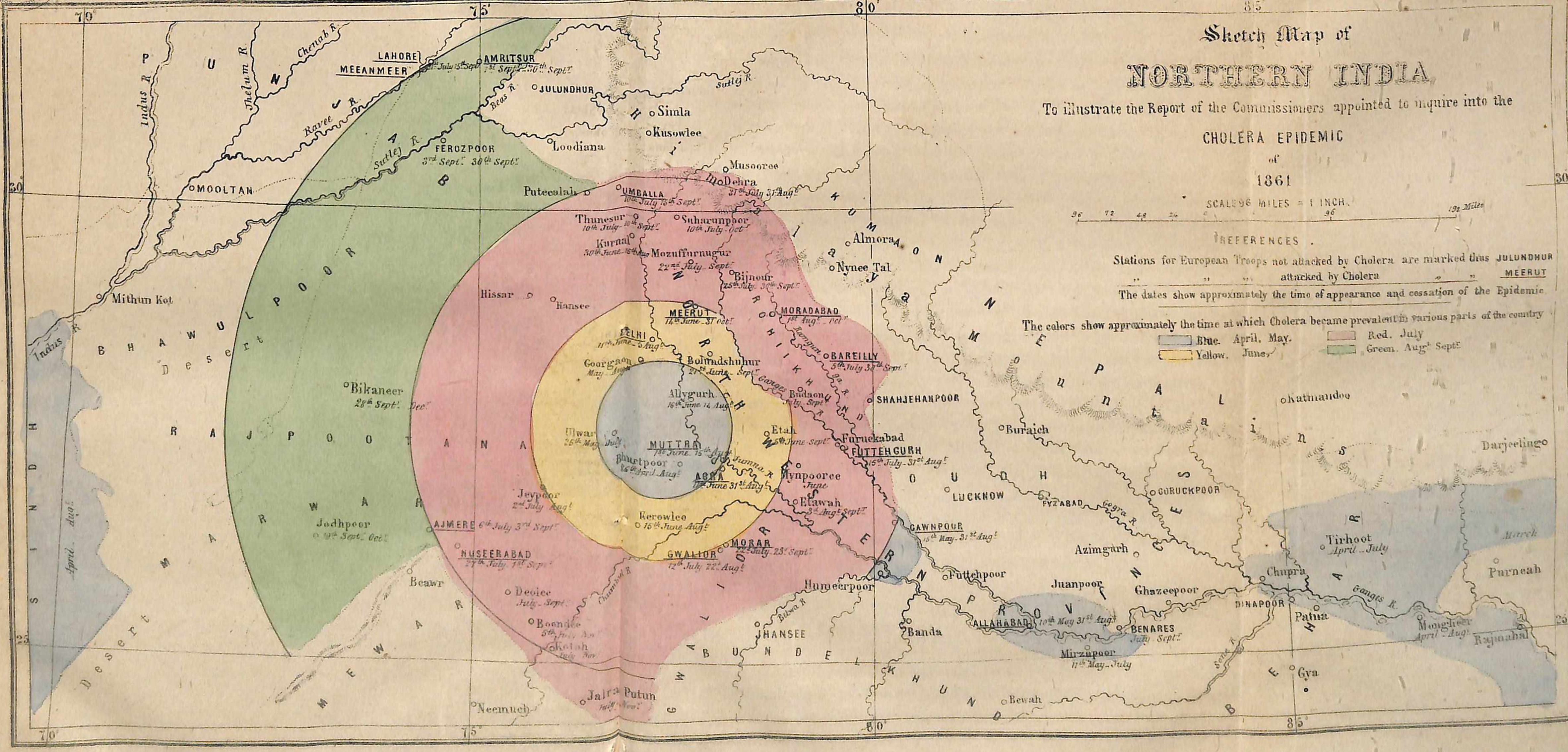
* Report on Epidemic Cholera, 1854.



Sketch Map of
NORTHERN INDIA

To illustrate the Report of the Commissioners appointed to inquire into the

CHOLERA EPIDEMIC

of

1861

SCALE 96 MILES = 1 INCH.

REFERENCES.

Stations for European Troops not attacked by Cholera are marked thus **JULUNDHUR**

" " " attacked by Cholera " " **MEERUT**

The dates show approximately the time of appearance and cessation of the Epidemic

The colors show approximately the time at which Cholera became prevalent in various parts of the country

- Blue. April, May.
- Yellow. June.
- Red. July
- Green. Augt Septr

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those in the Districts further to the north, the part of the country in which Cholera first became prevalent was the Bhurtpoor territory. It commenced, as we have shown, at the end of April, and became prevalent in the month of May. From this centre the disease appears to have become generally diffused.

During the months of May and June the circle was extended, with a radius of about 120 miles, northward to Delhi and Meerut, eastward to Allygurh, and southward to Kerowlee, while on the south-east and south-west it included Agra and Jyepoor. Thus, during the month of June, Cholera had spread through a circle some 250 miles in diameter. During July the radius was extended nearly 100 miles further. The circle now comprehended Umballa and Saharunpoor on the north; Rohilkhund and Furruckabad on the east; Gwalior, Kotah, Nuseerabad, and Ajmere on the south-east, south, and south-west. In August and September the radius of the constantly increasing circle was extended about 100 miles more, and included Lahore and Amritsur on the north-east; Bikaneer and Jodhpoor on the west. On the east the further progress of the disease appears to have been stopped by the Himalaya. On the west it was possibly stopped by the desert, but of this we have no sufficient information. The Epidemic did not extend into Central India; its further general progress may probably have been arrested by the increasing cold, although, as our detailed narrative has shown, it lingered in some of the more distant parts of Rajpootana through the coldest season of the year.

If we may judge from the imperfect information which has lately reached us, the disease in many parts of the North-Western Provinces did not really cease altogether with the winter, although it remained dormant for a time. In Saharunpoor and in the neighbouring Districts it is reported to have been often heard of at the commencement of the present hot season, and it has attacked virulently, as we shall notice further on, the mountainous Districts of Kumaon and Gurhwal.

The narrative in the first section of this Report gives the details upon which these conclusions regarding the progress of the Epidemic are founded. It must not be supposed that the disease can be traced from place to place with any sort of regularity through the concentric circles that we have represented. Nothing of this kind is possible. But speaking generally, we believe that Cholera advanced in the manner which we describe. Thus, for example, the disease did not commonly prevail in any part of the July circle during June, nor in any part of the August and September circles in July.

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It is probable, from the facts that have been collected, that while this was the general manner in which the disease advanced, it was diffused through the country from a number of local centres.

352. The facts that have been ascertained regarding Cholera among the Native population are not sufficient to enable us to enter further into this very interesting question. We had hoped to have been able to compare the manner in which other Epidemics have spread through Northern India. But there are no facts to go upon. Strange as it may seem, and little creditable as it may be, we believe that no connected and trustworthy account exists of any Epidemic of Cholera which has occurred in Northern India since 1818. At every step of our inquiry we have felt how immensely this complete ignorance of the past has increased the difficulties of our present task.

It will be observed that we have traced no connection between Cholera in Allahabad and Cawnpoor with that which occurred in the Districts further to the north. Probably these attacks may have been connected with the outbreaks of the disease in Northern Bengal and Behar, but it must be remembered that Cholera in Allahabad and Cawnpoor has become endemic.

The possible connection between the Epidemic of 1861, the Cholera which attacked Agra and Gwalior in the rainy season of 1860, that which raged in Sind in the winter of that year, and which re-appeared there in the hot season of 1861, remains uninvestigated. We can say nothing that would throw any useful light upon these questions.

353. Considering that although the European Troops suffered, as a general rule, far more severely than the Native population, the disease first appeared in every place among the Natives, the order of succession in which the Troops at various stations were attacked becomes a matter of little importance.

The accompanying sheet of Diagrams shows that in this respect there was nothing peculiar. Excepting at Allahabad and Cawnpoor, the rains had everywhere set in before the European Troops were attacked.

354. The account which we have given of the manner in which the disease became diffused through the country, and the remarks that were previously made regarding meteorological phenomena, will have shown sufficiently the reasons which appear to us to prove that atmospheric conditions alone can in no way explain the progress of the disease. We have shown that it commenced in April and May, at the very hottest and driest season of the year, while the hot westerly winds were raging; that it spread from a certain quarter to all points of the compass, at the average rate of a few miles every day, independently of

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all discoverable conditions; that after the rainy season was established, towards the end of June, it became generally more virulent; that it nevertheless continued to advance in the same manner, although at an accelerated rate; that after the rainy season had ended in September, the disease diminished, and that it had generally ceased at the commencement of the cold weather. There was no simultaneous outbreak, and there was no simultaneous climax in the intensity of the Epidemic.

Relation between Cholera and local sanitary conditions.

355. A similar kind of relation to that which exists between the seasons of the year and the prevalence of Cholera appears to hold good with regard to more purely local conditions. In the same manner that we find that Cholera, although it can evidently become virulent under atmospheric conditions of the most different character, usually prevails more especially in certain countries when certain conditions of climate are present, so also it has been everywhere observed that Cholera is especially liable to assume a virulently epidemic form when the local conditions are wanting upon which the purity of the air and water depend. These facts have been completely established in Europe; they are in entire accordance with all Indian observation, and they have been so universally dwelt upon and so universally acknowledged that we need say little of their importance. Nor in this respect does the case of Cholera appear to be peculiar. It is equally true of other diseases that their propagation is encouraged by the causes which tend to vitiate the sanitary conditions under which men live.

Although it cannot be doubted that, as a general rule, Cholera principally attacks those places of which the sanitary state is defective, it is not the less certain that during all widely diffused Epidemics, it constantly occurs that places situated under what seem to be the worst possible sanitary conditions escape altogether, while people living in other places under sanitary conditions, which are in all apparent respects superior, suffer severely. These facts, like the similar facts which bear upon the relations between meteorological phenomena and the disease, appear to be only explicable on the supposition that the cause of Cholera is a specific poison, which requires certain conditions for its full development and diffusion. Cholera will not be produced by dirt and over-crowding alone any more than by a particular state of the atmosphere. Thus, for example, while the filthiest parts of Lahore and Gwalior escaped the Cholera, because the specific cause was absent, the hospitals in the neighbouring Cantonments of Meean Meer and Morar suffered terribly, because, apparently, in addition to any general sanitary conditions that were unfavourable, the specific cause was present.

It is probably to similar reasons that we must look for the explanation of the fact that epidemic outbreaks of this disease sometimes gradually disappear, while at other times they cease suddenly, after perhaps reaching a maximum of virulence just before their termination in time, and perhaps on the margin of the area over which they have extended.

Connection between Cholera and famine.

356. We may here conveniently refer to a subject which was often noticed during the late Epidemic,—that of the possible connection between the outbreak of Cholera and the famine which attacked parts of the North-Western Provinces in 1860-61. It requires very little knowledge of the truth to show that the outbreak and general progress of the Epidemic was quite independent of the famine. A comparison between the facts that our present Report contains, and the account given of the famine by Colonel Baird Smith, will show that there is no room for doubt on this question, and it is unnecessary that we should enter into it any further. At the same time it is highly probable, we may perhaps say certain, that in many places the want and misery caused by the famine had the effect of greatly aggravating the mortality from Cholera. The evidence of this is found in the frequency with which, as we have shown in our narrative, the miserable objects collected in the Poor-houses were attacked by Cholera, and the excessive mortality that often occurred among them.

Diffusion of Cholera by human intercourse.

357. We now come to a most important question, which we must not evade,—that of the diffusion of Cholera by human intercourse. Having been appointed by the Government to undertake this investigation with the special object that we should suggest practical measures which might tend to the mitigation, in future, of the ravages of Cholera among the European Troops, it becomes our duty to state distinctly the conclusions upon which our recommendations are based. If Cholera be a disease that is communicable by human intercourse, it is the extremest folly to ignore the fact.

There can be no doubt that on this subject the belief of the highest Medical Authorities has undergone a great change. Fifteen or twenty years ago it was an almost universally accepted belief that Cholera was not a communicable disease. At the present time, although opinions differ very widely regarding the manner in which the disease is propagated, and although the term contagion may still be rejected, there can be no question that the weight of authority is now decidedly in favour of the belief that Cholera is, in some way or other, communicable by human intercourse. This belief is affected in no degree by the evidence which shows, that, under ordinary circumstances, Cholera is not directly communicable from man to man by contagion in the same manner which holds good for some diseases.

358. To this question the history of the late Epidemic will not bring any great amount of evidence so direct and positive as that which had been already collected in Europe. Circumstances were little favourable to the observation of any of the obscurer phenomena of the disease. Among the European Troops the Epidemic generally became virulently prevalent in so short a period, that the few Medical Officers who were present had little time for studying its character. While Cholera lasted, they were for the most part overwhelmed with work, and they could think of little but the urgent necessities of the moment. Regarding the disease among the Native population, our Medical Officers had seldom the opportunity of much personal observation, and the means of collecting trustworthy information on such subjects from others hardly exist in any part of India. So far, however, as the facts that have been ascertained regarding the late Epidemic entitle us to speak, they strongly support the belief that Cholera is communicable by human intercourse. Whether we consider the regularity of the progress of the Epidemic through the country at an approximately uniform rate under the most varying circumstances of climate, the manner in which places, under apparently identical sanitary conditions, have sometimes been attacked and sometimes avoided, or the circumstances which attended the local progress of the disease after it had become established in a station, all seems to tend to the same conclusion.

359. We have no hesitation in declaring our belief that, whether or not proof of this fact be complete, the evidence of its truth is so strong that it must, in the present state of our knowledge, form, to no small extent, the basis on which measures of prevention must be based.

Very different ideas have been attached to the term contagion, and we scruple to use it with reference to Cholera. When we state that the evidence appears to us almost decisive of the fact of the communicability of the disease, we in no way intend to express the belief that it is propagated by actual contact, or through the medium of infected air, or by any particular process, nor that the poison can only be multiplied by the disease itself. We simply concern ourselves with the fact, beyond which our knowledge does not extend, that Cholera is, under certain circumstances, communicable by human intercourse.

There can be no question that in former times the belief in the contagious properties of disease was carried to a most unreasonable and mischievous extent. In the opinion of many high Authorities, the re-action against that exaggerated belief has often led to something hardly less unreasonable, although the results have been less practically mischievous.

Thus, to give an example of our meaning, we find the most excellent of all sanitary reformers, whose name no one can mention without the highest admiration and respect, and whose labours for the benefit of the Soldier in particular have been so inestimable, carrying to such an extent the belief in the non-existence of infection, that she considers it needless to set apart wards in hospitals for infectious diseases. "In reality," she writes, "there ought to be no diseases so considered. With proper sanitary precautions, diseases reported to be the most infectious may be treated in wards among other sick without any danger * * *. Infection and incapable management, or bad construction, are, in hospitals as well as in towns, convertible terms."*

Although the principle seems to us a very dangerous one to carry into practice in the manner suggested, it may be commonly true that no zymotic disease can become dangerously prevalent where the sanitary state of a town or a building is every thing that can be desired. But this proves nothing more than that, unless certain conditions exist, the disease can hardly be developed. It does not prove that the idea of the existence of specific forms of communicable disease is an erroneous one. It is remarkable that with such examples before us as small-pox and syphilis, the possibility of specific contagion should ever have been denied in terms so general as those which have not unfrequently been used by Medical and Sanitary Authorities. Whether any particular disease is contagious or not, is a rational subject for investigation. To deny the existence of these contagious properties generally, is, as it seems to us, to deny facts which are quite as indubitable as any of those upon which all sanitary reformers are agreed.

The idea of a contagious pestilence, such as it presented itself to our forefathers, was doubtless in many respects a very exaggerated one. Yet, as Dr. Gairdner remarks, "it was not, as some *doctrinaires* of later times have affirmed, an untrue or essentially mistaken idea. It was, on the contrary, essentially true as regards the greater number of these destructive plagues; and notwithstanding all the attempts made in these latter days to indoctrinate the public mind with the opposite belief, it is now more certain than ever that the sanitary reformer must face this terrible *fact* of contagion, and regulate his proceedings accordingly, as he best may. But in the middle age, the fear of contagion amounted to a frenzy, absorbing all the energies that ought to have been devoted to the removal of the local causes of epidemic disease into the one consideration how best to keep it at bay when already formed."*

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* Miss Nightingale's notes on hospitals, page 7.

We now know that, with proper sanitary precautions, we can place a check upon epidemic disease, and from the experience that has been already gained, we are almost entitled to say that it is even now within the power of man to make such pestilences impossible as those which from time to time appear among us. But to enable us to attain completely so great an end, we must search sedulously for the facts which Nature sets before us. One of those facts we believe to be the existence of specific poisons† of disease, which are propagated, according to certain special laws, sometimes by what we call contagion, sometimes by other means; that these poisons require certain conditions for their development, and that by certain conditions their action is modified or destroyed. It was to the observation of such facts that we owe the immortal discovery of Jenner. If ever science succeed in delivering the human race from the terrible scourge of Cholera, it may be anticipated that success will not alone be due to the progress of general sanitary improvement. It will be due, if not to the discovery of the actual cause in which the disease has its origin, at least to the knowledge of the manner in which its specific poison can be propagated or can be rendered innocuous. This is a belief which in no manner supersedes or interferes with the conviction of the vast importance of every measure which can tend to the general improvement of the public health.

360. Most unwise ideas are too often prevalent upon the subject of admitting the fact that Cholera is a communicable disease. We do not hesitate to say that nine out of ten of the Medical Officers who witnessed the late Epidemic, whose opinion we have been able to ascertain, were firmly impressed with the belief that Cholera was, under certain circumstances, communicable by human intercourse. Yet, in their anxiety not to encourage a belief among the Soldiers which, they feared, might be practically mischievous, they not unfrequently acted as if they themselves possessed no conviction of the kind. There can be no greater error than to expose men to a positive danger for the sake of

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* Public health in relation to air and water.—*Edinburgh*, 1862.

† We use here and elsewhere the word 'poison' only in default of a better, to signify the original cause of disease, and without the least intention of giving expression to any theory regarding the actual nature of that cause.

avoiding another danger which is imaginary. This, to use the words of Dr. Budd, is allowing sentiment to intrude into the domain of science. To attempt the refutation of such sentiment by argument is impossible. It is sufficient to affirm that no measures can ever be useful unless they rest upon a basis not of sentiment but of fact. Soldiers are not irrational beings, and measures of precaution which they see are founded upon fact will be always not only the most useful, but also the most popular. So far, indeed, as the Soldiers are concerned, the experience of the late Epidemic authorizes us to declare, without doubt or hesitation, that no recognition by the Medical Officers of the fact of the communicability of Cholera could possibly have increased the strength of the belief which was already universal among the men, nor could any such recognition have added to the dread with which they looked upon the disease. The terror with which, as we have had so constantly to show in our narrative, they entered the hospitals, was in fact the expression of their belief in the reality of contagion.

361. The evidence which appears to support the belief that human intercourse had a large share in the general diffusion of the late Epidemic of Cholera through Northern India, is necessarily, in a great measure, rather presumptive than direct. The difficulty is extreme, in all thickly peopled countries, of obtaining, on such a question, facts of a completely satisfactory nature, and in India the difficulty is greatly increased by the little value which can generally be assigned to direct testimony.

We may properly take this opportunity of noticing some interesting facts bearing upon this general question, which, although not immediately connected with the Epidemic of 1861, deserve to be recorded.

The Districts of Kumaon and British Gurhwal lie entirely within the Himalaya mountains on the borders of Rohilkhund. They cover an area of about 12,000 square miles. The population is very scanty, scattered for the most part in small villages, which are often separated from one another by vast mountains and tracts of forest. These Districts are cut off from the plains of Northern India by an uninhabited belt of forest, and by the swampy and almost deserted region call the Terai. These tracts, some twenty miles in breadth, effectually cut off the inhabitants of the mountains from those of the plains. The intercourse between them is at all times very little, and confined to a few particular lines leading to places of pilgrimage or trade. Cholera is generally as completely absent from these mountains as it is from any part of Europe, but it has occasionally spread among their inhabitants epidemically with great virulence. In a country thus cut off from intercourse with its neighbours, and so thinly peopled, there are peculiar facilities for tracing

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the progress of an Epidemic, and these facilities are increased by the fact that there is perhaps no part of India where the Officers of our Government possess so minute a knowledge of the people.

During the last ten years, Cholera has three times appeared in these Mountain Districts; in 1852, in 1857, and again in May of the present year. On each of these three occasions the outbreak of Cholera has occurred under singularly similar circumstances.

Regarding the attack in 1857, Mr. B. W. Colvin, of the Civil Service, Senior Assistant Commissioner in charge of the Kumaon District, has given us the following interesting particulars. The President of our Commission can, from his own knowledge of the facts, vouch for the perfect correctness of Mr. Colvin's narrative:—

"*Note by* B. W. COLVIN, ESQ., C. S., *on an outbreak of Cholera in Kumaon during the year* 1857.

"In 1857 there was a very severe outbreak of Cholera in the Kumaon Hills.

"It was attended with some peculiar circumstances, which may throw light upon the disputed point of its contagious character. The object of this Note is to state these facts, so far as they can now be certainly known, as data for scientific observers.

"The evidence on which they rest is my own knowledge of them as an eyewitness, the official reports made at the time, and a Register of deaths from Cholera, which was kept at the Almora Tahseel. These have further been verified and corrected by recent inquiries.

"For the understanding of what follows, it is necessary to explain that Kumaon comprises two marked varieties of country. The first and by far the greater portion of it is entirely mountainous. The second is a flat strip of forest land which divides the mountains from the plains. This strip extends everywhere along the base of the hills, with an average width of about ten miles. It is called the Bhabur. The hill-country has a permanent population; the Bhabur has a migratory one of hillmen, who occupy it during the healthy months of winter, returning to their mountain villages in the hot season.

"A reference to the Map of Kumaon will show the places named below.

"The outbreak of which I am speaking commenced at Huldwanee, at the foot of the mountains, on December 15, 1856. It continued with more or less violence throughout the Bhabur for some months, but in the hills it scarcely showed itself in the three months between December 15, 1856, and March 15, 1857. In the Register of deaths in the hills, mentioned above, I find the following entries for those three months :—

January	1, 1857.—	In Almora	1 woman (resident).
„	1, „	Ditto	1 man (unknown).
„	1, „	In Sukkar, Baramundul	1 man.
„	3, „	In Almora Dispensary...	1 man (unknown).
„	6, „	In Almora	1 woman.
February	28, „	Ditto	1 man.
March	6, „	In Bagesur	1 man.
„	6, „	Ditto	1 woman.
		Total ...	8 cases.

Of these eight deaths, the two unknown men were probably persons who had come up from the Bhabur. It is likely that the Sukkar case was similar. This would only leave six or five indigenous cases in the hills for the three months ending March 15, 1857. This Register, however, cannot be regarded as completely accurate. I know of one village in the hills where persons arriving from the Bhabur sickened and died, and where their deaths were followed by others, which are not mentioned in the Register. The exact number of such unreported cases cannot now be ascertained; but they were not many. Between December 1856 and the ensuing March I travelled twice through the hills and over parts of them where the ravages of the disease were subsequently most severe, and I can assert with absolute confidence that these cases were very few, and that previous to March 1857, there was nothing approaching to Epidemic Cholera in any part of the hills. That this was the case is a matter of notoriety, which can be corroborated by the testimony of all those who were in the District at that time.

"In the middle of March 1857, the Head Quarters of the 66th Regiment Native Infantry arrived at Kaladoongee at the foot of the mountains below Nynee Tal, on their way to Almora, the Head Quarters of the Civil and Military Establishments of the Province. They arrived in excellent health and perfectly free from Cholera. But several deaths from Cholera had occurred among 4,000 coolies who had been collected at Kaladoongee for the transport of their baggage through the hills. The Regiment reached Kaladoongee on March 13th, and marched up the hill to Nynee Tal on the 14th. One cooly died of Cholera that day. On the morning of March 15th, eighteen of them were lying sick of it in the Nynee Tal Dispensary, and by mid-day a case had appeared among

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the Sepoys. The Regiment was ordered to march instantly. It left Nynee Tal that day and reached Almora on the 17th. But the disease had taken hold of both Sepoys and coolies, and a burying party which was sent in their rear picked up 18 corpses in the 30 miles between Nynee Tal and Almora. The arrival of the Regiment at Almora was followed by an outbreak of the disease, which, beginning in the Cantonments, spread into the town. The coolies on being dismissed from Almora, dispersed through the hills to their homes. As they retreated to their homes, they carried the disease with them, their course along two or three of the principal roads by which they retired being marked by bodies which the burying parties found. In their villages, after their return, the disease broke out in a violent epidemic form.

"It should be noticed that at Nynee Tal, where the Regiment halted for twenty-four hours, three men residing in the station were attacked and two died; but the disease left the station with the Regiment. It is another singular fact that the hills lying between Nynee Tal and Almora were not affected by the disease, except along the road itself. The Register from first to last does not show a single death among the villages in these tracts.

"A few days after the Head Quarters of the 66th Native Infantry reached Almora, the left Wing of the same Regiment, which had been detached from it before entering the Bhabur, arrived at Birmdeo en route to Lohooghat. Birmdeo is in the Bhabur, about 70 miles east of Kaladoongee. Lohooghat is a small station in the interior of the hills, 30 miles distant from the plains. Exactly the same phenomena were repeated as had occurred on the march to Almora. Cholera appeared at the foot of the hills among the 2,000 coolies who were collected for the Troops. Their journey from Birmdeo was accompanied by the disease, and on their arrival at Lohooghat, it first broke out violently in the Cantonments, then pursued the coolies to their homes, and finally spread as an Epidemic all over the eastern hills of Kumaon.

"At the same time that the disease entered the District at these two different points, it left the Nepalese Province of Dhotee untouched. Yet Dhotee is only separated from the hills surrounding Lohooghat by a river not 50 yards wide; and similar rivers in our own territories, where the coolies lived on both banks, offered no barrier to it.

"It is true that the Lohooghat outbreak occurred some days later than that at Almora. But there is no ground for believing that the malady travelled from the one place to the other. It did not appear in the hills lying between Almora and Lohooghat until after the Epidemic had spread widely round those two extreme points, nor, after careful enquiry,

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have I been able to learn that there was a single case of Cholera anywhere in the neighbourhood of Lohooghat previous to the arrival of the Troops.

" These facts, in their bearing on the contagion of Cholera, may be summed up thus—

" That some 6,000 men, among whom Cholera had shown itself, in passing through an infected belt of country, carried it through a healthy country at right angles to that belt for about 40 miles; that whilst they were travelling in a compact body, they did not communicate it, except to those with whom they actually came in contact on their line of road; that when a portion of them halted in a place previously healthy, the disease broke out there in an epidemic form; that when the remainder of them moved further on, the pest, following their tracks, established itself in their villages, and spread as an Epidemic from those centres which were previously free from infection.

" That exactly the same thing happened to another body of about 4,000 men from 50 to 70 miles distant, about a fortnight later, without a particle of evidence to lead to the supposition that one body communicated it to the other.

" That a neighbouring country exposed to the malady by every circumstance of physical similarity, and separated only by a political jealousy of intercourse, escaped it entirely.

" These facts, if not conclusive as to the possible propagation of " Cholera by contagion, are certainly in its favour.

B. W. COLVIN."

ALMORA,
1st *May* 1862.

362. In 1852 the President of our Commission, Mr. J. Strachey, was in Civil charge of the Hill District of Gurhwal, and the following facts occurred under his own immediate observation:—In the early part of 1852, extensive works of irrigation were in progress at the foot of the mountains in Kumaon, in the Bhabur, of which Mr. Colvin has spoken in his Note. Several thousand workmen were collected there from all parts of the neighbouring hills. Cholera broke out among these people with great virulence, and they fled panic-stricken to their homes, which were generally at a distance of several days' journey in the interior of the hills. Up to this time Cholera had been unheard of in Gurhwal, or in any part of the neighbouring mountains. This is a fact that was carefully inquired into and thoroughly ascertained. Many

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of the work-people who had fled from the Bhabur died upon the way to their homes; many others were attacked when they reached their villages. Then Cholera broke out among the other inhabitants of the villages, commencing in very many instances in the families of the men who had brought the disease from below. For a considerable time Cholera was entirely confined to places which had been in direct communication with persons suffering from the disease, but in the course of a few weeks it had become impossible any longer to trace such connection, and Cholera became generally epidemic through the hills. Many of the first cases were carefully investigated; it appeared to be proved beyond the possibility of a doubt, that in many instances Cholera had never been heard of in the village until the arrival of the men from the Bhabur, who were first attacked by it, and that after their arrival, it spread among the other inhabitants of the village, which in its turn again became a centre from which the pestilence was diffused. There were no other circumstances that could be discovered which appeared to throw even the possibility of doubt upon the fact that Cholera was brought by human intercourse into a District which, up to that time, had been perfectly free from every sign of the disease.

363. While this Report was under preparation, we were informed by Dr. F. Pearson, Superintendent of Vaccination in Kumaon and Rohilkhund, and by Colonel H. Ramsay, the Commissioner of the Province, that Cholera had again appeared in the hills under almost precisely similar circumstances.

The immense gathering of people which takes place every year in April at the Fair at Hurdwar, where the Ganges enters the plains from the mountains, always attracts, for purposes of religion or of trade, a large number of the inhabitants of the hills. Immediately after the Fair, the numerous pilgrims to the sacred sources of the Ganges begin their journey through the mountains of Gurhwal. In April 1862 Cholera had shown itself in the Saharunpoor District, and it broke out at the Hurdwar Fair. This caused much alarm among the people of the hills collected there. During the month of April they returned to their homes, and many of them were attacked with Cholera on the way. Up to this time there had been no Cholera in the Kumaon or Gurhwal mountains. This fact appears to be indisputable. But when these people from the plains reached their villages, Cholera in numerous instances appeared; generally attacking, in the first instance, the men themselves who had come from Hurdwar, then their families and immediate neighbours, and afterwards gradually spreading to the surrounding villages.

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A good example of this is afforded by the circumstances which occurred at Paoree, a village in Gurhwal, where the Head Quarters of the Civil Establishments of the District are situated. Their perfect authenticity is guaranteed by Dr. Pearson, who thoroughly inquired into them on the spot immediately after their occurrence. No case of Cholera had taken place at Paoree, nor in any part of the surrounding country, until the end of April, when a female pilgrim arrived from Hurdwar. She was allowed to rest for the night in the Government School-room, intending to go on again next morning. During the night she was seized with Cholera. The place was cleaned out, and the duties of the school went on as usual. Two days afterwards, one of the children attending the school was attacked, and shortly afterwards another. The houses of the children were in the village close by. Cholera then spread through the village, and twenty-two deaths occurred in about a fortnight. The villages in the neighbourhood which had constant communication with Paoree were soon afterwards attacked, and the disease before long had become common in the surrounding country.

The village of Mutgaon, in the valley of Gunnai, 30 miles west from Almora, was attacked about the same time under remarkable circumstances. Towards the end of April a man returned from Hurdwar to his home in this village. He had been in communication with persons suffering from Cholera, but he himself was not attacked. Almost immediately after his arrival Cholera broke out in the village, and proved fatal in a short time to thirteen persons out of a small population. For more than a fortnight after the disease had become virulent in this village, there was not a single case of Cholera in any part of the surrounding country for many miles on every side. This was apparently an instance in which the poison of the disease was carried by a healthy man, who himself escaped attack, into a previously healthy community.

The circumstances under which, on these three different occasions, Cholera has spread epidemically through these mountains, may possibly be otherwise explained; but it appears to us that if we disregard theories regarding the manner in which the disease may be diffused, and look only to facts, we can come to no other conclusion than this,—that Cholera was introduced in to Kumaon and Gurhwal by human intercourse, and that its subsequent diffusion through the country was caused, if not entirely, at least in a great measure, by the same agency.

We shall have occasion to notice some questions intimately connected with this part of the subject when we speak of the special circumstances under which the hospitals were often attacked by Cholera during the late Epidemic.

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Diffusion of Cholera by drinking-water.

364. Much has been said in Europe regarding the propagation of Cholera by impure drinking-water, and the evidence that has been produced to show that this has in some cases happened appears so strong that it is hardly possible to dispute it.[*] Here again we seem to find a repetition of the facts upon which we have before laid stress. In the same manner that no atmospheric conditions and no local sanitary conditions appear to be alone capable of producing Cholera, so it seems to be with impure water. Nothing could well be worse than the water-supply of some places in England which escaped the attack of Cholera while the disease was raging in the neighbourhood. Mere contamination of the drinking-water may cause disease, but it will not cause Cholera. The specific poison must in this case also be present.

The late Epidemic has given us very little information bearing upon this question. Regarding the contamination of the water of Meean Meer by the cess-pools, enough has been said already.[†] We can form no opinion regarding the extent to which, in this country, the diffusion of Cholera may be dependent upon the water, for facts are almost totally wanting. There can be no doubt that the water-supply, in most of our stations, is extremely unsatisfactory, and that the water is often contaminated by organic matter to a dangerous extent. Whether the influence of this cause, in the propagation of Cholera, be great or small, there can be no doubt that measures for the improvement of the water-supply are often urgently required.

365. Some of the facts stated in Dr. Hugh Macpherson's Paper on the mortality of Calcutta appear to have a very important possible connection with this subject. We find that in the five years ending with 1860, there were 716 deaths from Cholera among the European protestant population of Calcutta. This was one-fourth of the deaths recorded from all causes. Of these 716 deaths, 76 per cent. occurred among the floating population, consisting chiefly of sailors visiting the port. There has been no census—a little creditable fact—and no actual comparison between the liability of the resident and floating population to the attack of Cholera is possible; but there can be no doubt that the greater mortality among the sailors is out of all proportion to their numbers. It appears too, that in the five years in question, out of a total number

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[*] Vide, inter alia, Dr. R. D. Thomson's Reports, in the Appendix to the Report of the General Board of Health, on the Cholera Epidemic of 1854; and Dr. Gairdner on Public Health in relation to air and water.

[†] Vide Section I of this Report, in the account of the Epidemic at Meean Meer, and Appendix IV.

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of 1,170 deaths, from all causes, among the European floating population, no less than 46 per cent. occurred from Cholera, while among the resident male population, out of a total number of 822 deaths, only 13·7 per cent. were due to that cause. The existing data are altogether insufficient to enable us to explain these facts, but it is impossible to avoid the supposition that the character of the water which the sailors consume may have much to do with them. Cholera reaches its maximum, as we have already shown, among the native population in April, and May is the most fatal month to the sailors. The river is then at its lowest, and the water, which is at all times excessively impure, reaches its maximum of organic contamination. The tonnage of shipping in the port is at this season much below the average of the year, and the number of sailors is probably not far from its lowest point.

Although, writes Dr. Hugh Macpherson, "cases of Cholera will occur at times in all parts of the harbour, in spite of every precaution on the part of Captains of ships, and of steadiness and sobriety on the part of the crews, certain moorings are more obnoxious to the disease than others. The localities indicated are—Colvin's Ghat, which is close to the mouth of the great sewer,—Thompson's Ghat,—Tolly's Nullah,—the Cooly Bazar,—Fort Point,—and Armenian Ghat. Having taken some trouble to collect evidence on this head from the Marine Authorities as well as from Dr. Woodford, Police Surgeon, and other Medical men who have much to do with the shipping, I have arrived at the conclusion that no one of the moorings indicated is always infested with Cholera; nevertheless, when the complaint is prevalent, it is sure to show itself with special virulence at one or more of these places. They are, in short, the favourite haunts of this most unwelcome visitor. Any of the moorings may remain free from Cholera for a year or two, but it is sure to return; and the collective testimony of those who were good enough to favour me with their opinions on the subject tends to show that the moorings just below Colvin's Ghat are, as regards Cholera, the worst of any; the ship lying nearest the bank being liable, here as elsewhere, to suffer most severely, as a general rule, though it occasionally happens that the nearest ship escapes, while the one lying second or third off is violently attacked. At the same time it should be stated that the disease is often seen in a severe form in other spots than those just named,—at the Esplanade moorings, for example, which are usually healthy."

These remarkable facts, which the inquiries of Dr. Hugh Macpherson have brought to light, afford another good example of the neglect with which matters affecting in the highest degree the public health have hitherto been treated in India.

366. We here leave the consideration of this part of our subject. We have endeavoured to point out the general character of the relation which appears to exist between Cholera, atmospheric phenomena, and local sanitary conditions, and to show how the actual cause in which the disease has its origin, and without which its diffusion is impossible, is apparently separate from all these, however closely it may depend upon them. To quote the words of Dr. Budd on a kindred subject, there is one thread which connects the facts which often seem so discordant. "Running through all these circumstances, there is plainly but one thing constant; that is to say, a specific morbid cause,—a cause which is neither a permanent product of the soil, or air, or of particular seasons, but which is susceptible of transmission from place to place; which breeds as it goes, and then again dies out or becomes dormant, without leaving any sign to mark its track."*

We proceed now to consider the evidence which has been obtained to show the effect of other causes than those which have hitherto been noticed; to inquire how differences of race, of social conditions, of sex, of age, and other circumstances have influenced the liability to the attack of Cholera.

367. Although we cannot attempt to form even a rough approximation to the total actual mortality that occurred among the Native population of Northern India during the late Epidemic, our narrative will have made it sufficiently plain that the European Troops generally suffered in proportion to their strength far more severely than the Natives. It is important that we should endeavour to ascertain whether this greater virulence of the disease among the former was in any way a peculiarity of this Epidemic, and on what causes it appears chiefly to have depended.

The available statistics of mortality and disease, even for our European Troops, are most unsatisfactory and imperfect; for the general Native population outside Calcutta itself there are no data at all. The Returns showing the mortality among the Native Troops and among the prisoners in Jails afford almost the only available means in this part of India for making a comparison between the liability of Europeans and Natives to the attack of Cholera.

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* On the propagation of typhoid fever.—*London*, 1861.

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We have drawn up the following Table to illustrate this question :—

TABLE I.

Showing the Mortality from Cholera, for the periods stated, among the European and Native Troops and Prisoners in Jails.

BENGAL PRESIDENCY.

	Period of Observation.	Aggregate Strength.	Average annual Strength.	DEATHS FROM ALL CAUSES.		CHOLERA.					
				Aggregate Number of Deaths.	Average Number of Deaths per 1,000 men per annum.	Aggregate Number of Cases.	Aggregate Number of Deaths.	Average Number of Cases per 1,000 men per annum.	Average Number of Deaths per 1,000 men per annum.	Percentage Deaths to Cases.	Percentage Deaths from Cholera to Deaths from all causes.
European Troops	1833 to 1853, 21 years.	331,779	15,799	21,007	63	8,742	3,365	26	10	38·8	16·0
Native Troops	1833 to 1852, 20 years.	2,025,320	101,266	29,277	14	10,979	3,665	5	2	33·4	12·5
Prisoners in Jails	1833 to 1853, 21 years.	1,053,825	50,182	76,404	61	21,663	9,236	21	9	42·6	12·9
			MADRAS PRESIDENCY.								
European Troops	1821 to 1846, 26 years.	284,133	10,928	...	...	8,382	2,494	29	9	29·8	
Native Troops	Ditto	1,804,779	69,415	...	...	26,716	10,752	15	6	40·3	

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Showing the comparative virulence of Cholera during the Epidemic of 1861, at each Station, among the European Troops, Officers, Men, Women, and Children, for each branch of the Service.

STATION.	RANK, &c.	INFANTRY.						CAVALRY.						ROYAL ARTILLERY.						BENGAL ARTILLERY.						TOTAL.					
		Absolute Number.			Percentage.			Absolute Number.			Percentage.			Absolute Number.			Percentage.			Absolute Number.			Percentage.			Absolute Number.			Percentage.		
		Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.
Meean Meer.	Officers ...	32	3	1	9·4	3·1	33·3	8	...	...	...	...	...	2	...	...	...	...	...	7	...	...	...	...	...	49	3	1	6·1	2·0	33·3
	Medical Officers ...	12	...	...	...	...	...	2	1	...	50·0	...	...	1	...	...	...	...	...	3	...	...	...	...	...	18	1	...	5·6	...	...
	Non-Commissioned Officers	138	70	46	50·7	33·3	65·7	34	6	5	17·6	14·7	83·3	183	19	16	10·4	8·7	84·2	70	5	5	7·1	7·1	100·0	242	81	56	34·3	23·1	69·2
	Men ...	1,410	652	378	46·2	26·8	58·0	189	37	26	19·6	13·8	70·3	...	...	...	...	...	...	150	17	10	11·3	6·7	58·8	1,932	725	430	37·5	22·3	59·3
	Women ...	79	33	18	41·8	22·8	54·6	4	...	...	...	...	...	7	2	2	28·6	28·6	100·0	33	1	1	3·0	3·0	100·0	123	36	21	29·3	17·1	58·3
	Children ...	99	34	26	34·3	26·3	76·5	3	...	...	...	...	...	7	1	1	14·3	14·3	100·0	46	3	1	6·5	2·2	33·3	155	38	28	24·5	18·1	73·7
Amritsur.	Officers ...	10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5	...	...	...	...	...	15	...	...	...	...	...
	Medical Officers ...	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...	...	...	7	...	...	...	...	...
	Non-Commissioned Officers	44	2	2	4·5	4·5	100·0	...	...	...	...	...	...	...	...	...	...	...	...	16	...	...	...	...	...	60	2	2	3·3	3·3	100·0
	Men ...	390	45	36	11·5	9·2	80·0	...	...	...	...	...	...	...	...	...	...	...	...	91	4	3	4·4	3·3	75·0	481	49	39	10·2	8·1	79·6
	Women ...	15	1	1	6·7	6·7	100·0	...	...	...	...	...	...	...	...	...	...	...	...	14	1	1	7·1	7·1	100·0	29	2	2	6·9	6·9	100·0
	Children ...	9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	18	...	...	...	...	...	27	...	...	...	...	...
Umballa.	Officers ...	19	...	...	...	...	...	16	...	...	...	...	...	...	...	...	...	...	...	9	...	...	...	...	...	44	...	...	...	...	...
	Medical Officers ...	3	...	...	...	...	...	3	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...	...	...	9	...	...	...	...	...
	Non-Commissioned Officers	89	3	3	3·4	3·4	100·0	72	3	2	4·2	2·8	66·7	...	...	...	...	...	...	237	...	...	...	...	...	161	6	5	3·7	3·1	83·3
	Men ...	790	58	42	7·3	5·3	72·4	582	7	5	1·2	0·9	71·4	...	...	...	...	...	...							1,609	65	47	4·0	2·9	72·3
	Women ...	39	3	2	7·7	5·1	66·7	27	...	...	...	...	...	...	...	...	...	...	...	26	...	...	...	...	...	92	3	2	3·3	2·2	66·7
	Children ...	57	9	8	15·8	14·0	88·9	28	1	1	3·6	3·6	100·0	...	...	...	...	...	...	39	...	...	...	...	...	124	10	9	8·1	7·3	90·0
Delhi.	Officers ...	20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	8	...	...	...	...	...	28	...	...	...	...	...
	Medical Officers ...	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	4	...	...	...	...	...
	Non-Commissioned Officers	91	14	7	15·4	7·7	50·0	...	...	...	...	...	...	...	...	...	...	...	...	26	5	2	19·2	7·7	40·0	117	19	9	16·2	7·7	47·4
	Men ...	1,014	81	37	8·0	3·6	45·7	...	...	...	...	...	...	...	...	...	...	...	...	136	20	6	14·7	4·4	30·0	1,150	101	43	8·8	3·7	42·6
	Women ...	72	14	7	19·4	9·7	50·0	...	...	...	...	...	...	...	...	...	...	...	...	28	4	1	14·3	3·6	25·0	100	18	8	18·0	8·0	44·4
	Children ...	84	14	5	16·7	5·9	35·7	...	...	...	...	...	...	...	...	...	...	...	...	36	2	2	5·6	5·6	100·0	120	16	7	13·3	5·8	43·8
Meerut.	Officers ...	18	...	...	...	...	...	20	3	2	15·0	10·0	66·7	6	...	...	...	...	...	35	3	2	8·6	5·7	66·7	79	6	4	7·9	5·3	66·7
	Medical Officers ...	2	...	...	...	...	...	2	...	...	...	...	...	2	...	...	...	...	...	3	...	...	...	...	...	9	...	...	...	...	...
	Non-Commissioned Officers	96	2	2	2·1	2·1	100·0	75	8	6	10·7	8·0	75·0	41	...	...	...	...	...	57	...	...	...	...	...	269	10	8	3·7	3·0	80·0
	Men ...	1,016	30	24	3·0	3·9	80·0	586	32	23	5·5	3·9	71·9	319	4	4	1·3	1·3	100·0	561	41	27	2·4	1·6	65·9	2,482	107	78	4·3	3·1	72·9
	Women ...	81	5	4	6·2	4·9	80·0	32	2	2	6·3	6·3	100·0	8	1	1	12·5	12·5	100·0	79	2	1	2·5	1·3	50·0	200	10	8	5·0	4·0	80·0
	Children ...	112	5	5	4·5	4·5	100·0	42	4	3	9·5	7·1	75·0	7	...	...	...	...	...	113	5	5	4·4	4·4	100·0	274	14	13	5·1	4·7	92·9
Moradabad.	Officers ...	10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	10	...	...	...	...	...
	Medical Officers ...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...
	Non-Commissioned Officers	40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	40	...	...	...	...	...
	Men ...	42[illegible]	2	2	0·4	0·4	100·0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	425	2	2	0·4	0·4	100·0
	Women ...	27	1	1	3·7	3·7	100·0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	27	1	1	3·7	3·7	100·0
	Children ...	27	1	1	3·7	3·7	100·0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	27	1	1	3·7	3·7	100·0
Bareilly.	Officers ...	23	...	...	...	...	...	...	...	...	...	...	...	5	...	...	...	...	...	...	...	...	...	...	...	28	...	...	...	...	...
	Medical Officers ...	4	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	5	...	...	...	...	...
	Non-Commissioned Officers	92	1	1	1·1	1·1	100·0	...	...	...	...	...	...	174	...	...	...	...	...	...	...	...	...	...	...	92	1	1	1·1	1·1	100·0
	Men ...	900	5	4	0·5	0·4	80·0	...	...	...	...	...	...							...	...	...	...	...	...	1,074	5	4	0·5	0·4	80·0
	Women ...	33	...	...	...	...	...	...	...	...	...	...	...	8	...	...	...	...	...	...	...	...	...	...	...	41	...	...	...	...	...
	Children ...	39	...	...	...	...	...	...	...	...	...	...	...	4	...	...	...	...	...	...	...	...	...	...	...	43	...	...	...	...	...
Muttra.	Officers ...	...	...	...	...	...	...	18	1	...	5·5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	18	1	...	5·5	...	...
	Medical Officers ...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...
	Non-Commissioned Officers	...	...	...	...	...	...	245	18	4	7·3	1·6	22·2	...	...	...	...	...	...	106	...	...	...	...	...	351	18	4	5·1	1·1	22·2
	Men ...																														
	Women ...	...	...	...	...	...	...	21	2	...	9·5	...	...	...	...	...	...	...	...	5	...	...	...	...	...	26	2	...	7·7	...	...
	Children ...	...	...	...	...	...	...	31	2	...	6·4	...	...	...	...	...	...	...	...	6	...	...	...	...	...	37	2	...	5·4	...	...
Agra.	Officers ...	29	1	1	3·4	3·4	100·0	...	...	...	...	...	...	...	...	...	...	...	...	6	1	1	16·7	16·7	100·0	35	2	2	5·7	5·7	100·0
	Medical Officers ...	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	5	...	...	...	...	...
	Non-Commissioned Officers	113	9	5	8·0	4·4	55·6	...	...	...	...	...	...	...	...	...	...	...	...	19	...	...	...	...	...	132	9	5	6·8	3·8	55·6
	Men ...	929	92	59	9·9	6·3	64·1	...	...	...	...	...	...	...	...	...	...	...	...	92	8	3	8·7	3·3	37·5	1,021	100	62	9·8	6·1	62·0
	Women ...	65	7	2	10·7	3·1	28·6	...	...	...	...	...	...	...	...	...	...	...	...	15	...	...	...	...	...	80	7	2	8·8	2·5	28·6
	Children ...	76	3	3	3·9	3·9	100·0	...	...	...	...	...	...	...	...	...	...	...	...	31	2	1	6·5	3·2	50.0	107	5	4	4·7	3·7	80·0
Morar.	Officers ...	16	2	2	12·5	12·5	100·0	...	...	...	...	...	...	...	...	...	...	...	...	8	...	...	...	...	...	24	2	2	8·3	8·3	100·0
	Medical Officers ...	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	7	...	...	...	...	...
	Non-Commissioned Officers	89	24	14	27·0	15·7	58·3	...	...	...	...	...	...	...	...	...	...	...	...	18	...	...	...	...	...	107	24	14	22·4	13·1	58·3
	Men ...	795	173	129	21·8	16·2	74·6	...	...	...	...	...	...	...	...	...	...	...	...	193	12	8	6·2	4·1	66·7	988	185	137	18·7	13·9	74·0
	Women ...	80	19	12	23·8	15·0	63·2	...	...	...	...	...	...	...	...	...	...	...	...	25	1	1	4·0	4·0	100·0	105	20	13	19·0	12·4	65·0
	Children ...	158	32	26	20·3	16·5	81·3	...	...	...	...	...	...	...	...	...	...	...	...	25	4	4	16·0	16·0	100·0	183	36	30	19·7	16·4	83·3
Fort Gwalior.	Officers ...	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5	...	...	...	...	...
	Medical Officers ...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...
	Non-Commissioned Officers	26	1	1	3·8	3·8	100·0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	26	1	1	3·8	3·8	100·0
	Men ...	243	7	6	2·9	2·5	85·7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	243	7	6	2·9	2·5	85·7
	Women ...	14	2	1	14·3	7·1	50·0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	14	2	1	14·3	7·1	50·0
	Children ...	25	2	2	8·0	8·0	100·0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	25	2	2	8·0	8·0	100·0
Nusserabad.	Officers ...	25	2	1	8·0	4·0	50·0	10	2	2	20·0	20·0	100·0	...	...	...	...	...	...	4	...	...	...	...	...	39	4	3	10·3	7·7	75·0
	Medical Officers ...	3	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	5	...	...	...	...	...
	Non-Commissioned Officers	61	...	...	...	...	...	238	15	10	6·3	4·2	66·7	...	...	...	...	...	...	23	1	...	4·3	...	...	84	1	...	1·2	...	...
	Men ...	830	25	20	3·0	2·4	80·0													91	3	...	3·3	...	...	1,159	43	30	3·7	2·6	69·9
	Women ...	65	8	7	12·3	10·8	87·5	14	4	4	28·6	28·6	100·0	...	...	...	...	...	...	12	1	1	8·3	8·3	100·0	91	13	12	14·3	13·2	92·3
	Children ...	99	4	4	4·0	4·0	100·0	11	...	...	...	...	...	...	...	...	...	...	...	12	1	...	8·3	...	...	122	5	4	4·1	3·3	80·0
Futtehgurh.	Officers ...	7	...	...	...	...	...	...	...	...	...	...	...	4	...	...	...	...	...	...	...	...	...	...	...	11	...	...	...	...	...
	Medical Officers ...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...
	Non-Commissioned Officers	26	...	...	...	...	...	...	...	...	...	...	...	25	...	...	...	...	...	...	...	...	...	...	...	51	...	...	...	...	...
	Men ...	230	11	4	4·8	1·7	36·3	...	...	...	...	...	...	164	1	1	0·6	0·6	100·0	...	...	...	...	...	...	394	12	5	3·0	1·3	41·7
	Women ...	9	1	1	11·1	11·1	100·0	...	...	...	...	...	...	13	...	...	...	...	...	...	...	...	...	...	...	22	1	1	4·5	4·5	100·0
	Children ...	17	...	...	...	...	...	...	...	...	...	...	...	11	...	...	...	...	...	...	...	...	...	...	...	28	...	...	...	...	...
Cawnpoor.	Officers ...	16	...	...	...	...	...	14	...	...	...	...	...	...	...	...	...	...	...	4	...	...	...	...	...	34	...	...	...	...	...
	Medical Officers ...	3	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	6	...	...	...	...	...
	Non-Commissioned Officers	947	37	24	3·9	2·5	64·9	220	10	7	4·5	3·2	70·0	...	...	...	...	...	...	83	1	1	1·2	1·2	100·0	1,250	48	32	3·8	2·6	66·7
	Men ...																														
	Women ...	50	5	3	10·0	6·0	60·0	19	...	...	...	...	...	...	...	...	...	...	...	14	...	...	...	...	...	83	5	3	6·0	3·6	60·0
	Children ...	64	2	1	3·1	1·5	50·0	19	...	...	...	...	...	...	...	...	...	...	...	10	...	...	...	...	...	93	2	1	2·2	1·1	50·0
Allahabad.	Officers ...	21	1	1	4·8	4·8	100·0	...	...	...	...	...	...	4	...	...	...	...	...	4	...	...	...	...	...	29	1	1	3·4	3·4	100·0
	Medical Officers ...	2	...	...	...	...	...	...	...	...	...	...	...	1	1	...	100·0	100·0	...	1	...	...	...	...	...	4	1	...	25·0	...	...
	Non-Commissioned Officers	100	4	...	4·0	...	...	...	...	...	...	...	...	187	3	2	...	...	...	95	1	1	...	...	...	100	4	...	4·0	...	...
	Men ...	888	25	19	2·8	2·1	76·0	...	...	...	...	...	...													1,170	29	22	2·5	1·9	75·9
	Women ...	29	1	1	3·4	3·4	100·0	...	...	...	...	...	...	12	...	...	...	...	...	17	...	...	...	...	...	58	1	1	1·7	1·7	100·0
	Children ...	31	2	2	6·5	6·5	100·0	...	...	...	...	...	...	13	...	...	...	...	...	18	...	...	...	...	...	62	2	2	3·2	3·2	100·0
Grand Total.	Officers ...	251	9	6	3·6	2·4	66·7	86	6	4	7·0	4·6	66·7	21	...	...	...	...	...	90	4	3	4·4	3·4	75·0	448	19	13	4·2	2·9	68·4
	Medical Officers ...	49	...	...	...	...	...	11	1	...	9·1	...	...	6	1	...	16·7	...	...	18	...	...	...	...	...	84	2	...	2·4	...	...
	Non-Commissioned Officers	1,005	130	81	12·9	8·1	62·3	181	17	13	9·4	7·2	76·5	66	...	...	...	...	...	229	11	7	4·8	3·1	63·6	1,481	158	101	10·7	6·8	63·9
	Men ...	10,807	1,243	784	11·5	7·0	63·1	2,060	119	75	5·8	3·6	63·0	1,027	27	23	2·6	2·2	85·2	1,835	107	59	5·8	3·2	45·1	15,729	1,496	941	9·5	6·0	62·9
	Women ...	658	100	60	15·2	9·1	60·0	117	8	6	6·8	5·1	75·0	48	3	3	6·2	6·2	100·0	268	10	6	3·7	2·2	60·0	1,091	121	75	11·1	6·9	62·0
	Children ...	897	108	83	12·0	9·3	76·9	134	7	4	5·2	3·0	57·1	42	1	1	2·4	2·4	100·0	354	17	13	4·8	3·7	76·5	1,427	133	101	9·2	6·9	75·9
	Total ...	13,667	1,590	1,014	11·6	7·3	63·8	2,589	158	102	6·1	3·9	64·6	1,210	32	27	2·6	2·2	84·4	2,794	149	88	5·3	3·1	59·1	20,260	1,929	1,231	9·5	6·1	63·8

Showing the comparative virulence of Cholera during the Epidemic of 1861, at each Station, among the European Troops, Officers, Men, Women, and Children, for each branch of the Service.

STATION.	RANK, &c.	INFANTRY.						CAVALRY.						ROYAL ARTILLERY.						BENGAL ARTILLERY.						TOTAL.					
		Absolute Number.			Percentage.			Absolute Number.			Percentage.			Absolute Number.			Percentage.			Absolute Number.			Percentage.			Absolute Number.			Percentage.		
		Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.
Meean Meer.	Officers ...	32	3	1	9·4	3·1	33·3	8	...	...	...	...	...	2	...	...	...	...	...	7	...	...	...	...	...	49	3	1	6·1	2·0	33·3
	Medical Officers ...	12	...	...	...	...	...	2	1	...	50·0	...	...	1	...	...	...	...	...	3	...	...	...	...	...	18	1	...	5·6	...	...
	Non-Commissioned Officers	138	70	46	50·7	33·3	65·7	34	6	5	17·6	14·7	83·3	183	19	16	10·4	8·7	84·2	70	5	5	7·1	7·1	100·0	242	81	56	34·3	23·1	69·2
	Men ...	1,410	652	378	46·2	26·8	58·0	189	37	26	19·6	13·8	70·3	...	...	...	...	...	...	150	17	10	11·3	6·7	58·8	1,932	725	430	37·5	22·3	59·3
	Women ...	79	33	18	41·8	22·8	54·6	4	...	...	...	...	...	7	2	2	28·6	28·6	100·0	33	1	1	3·0	3·0	100·0	123	36	21	29·3	17·1	58·3
	Children ...	99	34	26	34·3	26·3	76·5	3	...	...	...	...	...	7	1	1	14·3	14·3	100·0	46	3	1	6·5	2·2	33·3	155	38	28	24·5	18·1	73·7
Amritsur.	Officers ...	10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5	...	...	...	...	...	15	...	...	...	...	...
	Medical Officers ...	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...	...	...	7	...	...	...	...	...
	Non-Commissioned Officers	44	2	2	4·5	4·5	100·0	...	...	...	...	...	...	...	...	...	...	...	...	16	...	...	...	...	...	60	2	2	3·3	3·3	100·0
	Men ...	390	45	36	11·5	9·2	80·0	...	...	...	...	...	...	...	...	...	...	...	...	91	4	3	4·4	3·3	75·0	481	49	39	10·2	8·1	79·6
	Women ...	15	1	1	6·7	6·7	100·0	...	...	...	...	...	...	...	...	...	...	...	...	14	1	1	7·1	7·1	100·0	29	2	2	6·9	6·9	100·0
	Children ...	9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	18	...	...	...	...	...	27	...	...	...	...	...
Umballa.	Officers ...	19	...	...	...	...	...	16	...	...	...	...	...	...	...	...	...	...	...	9	...	...	...	...	...	44	...	...	...	...	...
	Medical Officers ...	3	...	...	...	...	...	3	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...	...	...	9	...	...	...	...	...
	Non-Commissioned Officers	89	3	3	3·4	3·4	100·0	72	3	2	4·2	2·8	66·7	...	...	...	...	...	...	237	...	...	...	...	...	161	6	5	3·7	3·1	83·3
	Men ...	790	58	42	7·3	5·3	72·4	582	7	5	1·2	0·9	71·4	...	...	...	...	...	...							1,609	65	47	4·0	2·9	72·3
	Women ...	39	3	2	7·7	5·1	66·7	27	...	...	...	...	...	...	...	...	...	...	...	26	...	...	...	...	...	92	3	2	3·3	2·2	66·7
	Children ...	57	9	8	15·8	14·0	88·9	28	1	1	3·6	3·6	100·0	...	...	...	...	...	...	39	...	...	...	...	...	124	10	9	8·1	7·3	90·0
Delhi.	Officers ...	20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	8	...	...	...	...	...	28	...	...	...	...	...
	Medical Officers ...	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	4	...	...	...	...	...
	Non-Commissioned Officers	91	14	7	15·4	7·7	50·0	...	...	...	...	...	...	...	...	...	...	...	...	26	5	2	19·2	7·7	40·0	117	19	9	16·2	7·7	47·4
	Men ...	1,014	81	37	8·0	3·6	45·7	...	...	...	...	...	...	...	...	...	...	...	...	136	20	6	14·7	4·4	30·0	1,150	101	43	8·8	3·7	42·6
	Women ...	72	14	7	19·4	9·7	50·0	...	...	...	...	...	...	...	...	...	...	...	...	28	4	1	14·3	3·6	25·0	100	18	8	18·0	8·0	44·4
	Children ...	84	14	5	16·7	5·9	35·7	...	...	...	...	...	...	...	...	...	...	...	...	36	2	2	5·6	5·6	100·0	120	16	7	13·3	5·8	43·8
Meerut.	Officers ...	18	...	...	...	...	...	20	3	2	15·0	10·0	66·7	6	...	...	...	...	...	35	3	2	8·6	5·7	66·7	79	6	4	7·9	5·3	66·7
	Medical Officers ...	2	...	...	...	...	...	2	...	...	...	...	...	2	...	...	...	...	...	3	...	...	...	...	...	9	...	...	...	...	...
	Non-Commissioned Officers	96	2	2	2·1	2·1	100·0	75	8	6	10·7	8·0	75·0	41	...	...	...	...	...	57	...	...	...	...	...	269	10	8	3·7	3·0	80·0
	Men ...	1,016	30	24	3·0	3·9	80·0	586	32	23	5·5	3·9	71·9	319	4	4	1·3	1·3	100·0	561	41	27	2·4	1·6	65·9	2,482	107	78	4·3	3·1	72·9
	Women ...	81	5	4	6·2	4·9	80·0	32	2	2	6·3	6·3	100·0	8	1	1	12·5	12·5	100·0	79	2	1	2·5	1·3	50·0	200	10	8	5·0	4·0	80·0
	Children ...	112	5	5	4·5	4·5	100·0	42	4	3	9·5	7·1	75·0	7	...	...	...	...	...	113	5	5	4·4	4·4	100·0	274	14	13	5·1	4·7	92·9
Moradabad.	Officers ...	10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	10	...	...	...	...	...
	Medical Officers ...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...
	Non-Commissioned Officers	40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	40	...	...	...	...	...
	Men ...	42[illegible]	2	2	0·4	0·4	100·0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	425	2	2	0·4	0·4	100·0
	Women ...	27	1	1	3·7	3·7	100·0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	27	1	1	3·7	3·7	100·0
	Children ...	27	1	1	3·7	3·7	100·0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	27	1	1	3·7	3·7	100·0
Bareilly.	Officers ...	23	...	...	...	...	...	...	...	...	...	...	...	5	...	...	...	...	...	...	...	...	...	...	...	28	...	...	...	...	...
	Medical Officers ...	4	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	5	...	...	...	...	...
	Non-Commissioned Officers	92	1	1	1·1	1·1	100·0	...	...	...	...	...	...	174	...	...	...	...	...	...	...	...	...	...	...	92	1	1	1·1	1·1	100·0
	Men ...	900	5	4	0·5	0·4	80·0	...	...	...	...	...	...							...	...	...	...	...	...	1,074	5	4	0·5	0·4	80·0
	Women ...	33	...	...	...	...	...	...	...	...	...	...	...	8	...	...	...	...	...	...	...	...	...	...	...	41	...	...	...	...	...
	Children ...	39	...	...	...	...	...	...	...	...	...	...	...	4	...	...	...	...	...	...	...	...	...	...	...	43	...	...	...	...	...
Muttra.	Officers ...	...	...	...	...	...	...	18	1	...	5·5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	18	1	...	5·5	...	...
	Medical Officers ...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...
	Non-Commissioned Officers	...	...	...	...	...	...	245	18	4	7·3	1·6	22·2	...	...	...	...	...	...	106	...	...	...	...	...	351	18	4	5·1	1·1	22·2
	Men ...																														
	Women ...	...	...	...	...	...	...	21	2	...	9·5	...	...	...	...	...	...	...	...	5	...	...	...	...	...	26	2	...	7·7	...	...
	Children ...	...	...	...	...	...	...	31	2	...	6·4	...	...	...	...	...	...	...	...	6	...	...	...	...	...	37	2	...	5·4	...	...
Agra.	Officers ...	29	1	1	3·4	3·4	100·0	...	...	...	...	...	...	...	...	...	...	...	...	6	1	1	16·7	16·7	100·0	35	2	2	5·7	5·7	100·0
	Medical Officers ...	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	5	...	...	...	...	...
	Non-Commissioned Officers	113	9	5	8·0	4·4	55·6	...	...	...	...	...	...	...	...	...	...	...	...	19	...	...	...	...	...	132	9	5	6·8	3·8	55·6
	Men ...	929	92	59	9·9	6·3	64·1	...	...	...	...	...	...	...	...	...	...	...	...	92	8	3	8·7	3·3	37·5	1,021	100	62	9·8	6·1	62·0
	Women ...	65	7	2	10·7	3·1	28·6	...	...	...	...	...	...	...	...	...	...	...	...	15	...	...	...	...	...	80	7	2	8·8	2·5	28·6
	Children ...	76	3	3	3·9	3·9	100·0	...	...	...	...	...	...	...	...	...	...	...	...	31	2	1	6·5	3·2	50.0	107	5	4	4·7	3·7	80·0
Morar.	Officers ...	16	2	2	12·5	12·5	100·0	...	...	...	...	...	...	...	...	...	...	...	...	8	...	...	...	...	...	24	2	2	8·3	8·3	100·0
	Medical Officers ...	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	7	...	...	...	...	...
	Non-Commissioned Officers	89	24	14	27·0	15·7	58·3	...	...	...	...	...	...	...	...	...	...	...	...	18	...	...	...	...	...	107	24	14	22·4	13·1	58·3
	Men ...	795	173	129	21·8	16·2	74·6	...	...	...	...	...	...	...	...	...	...	...	...	193	12	8	6·2	4·1	66·7	988	185	137	18·7	13·9	74·0
	Women ...	80	19	12	23·8	15·0	63·2	...	...	...	...	...	...	...	...	...	...	...	...	25	1	1	4·0	4·0	100·0	105	20	13	19·0	12·4	65·0
	Children ...	158	32	26	20·3	16·5	81·3	...	...	...	...	...	...	...	...	...	...	...	...	25	4	4	16·0	16·0	100·0	183	36	30	19·7	16·4	83·3
Fort Gwalior.	Officers ...	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5	...	...	...	...	...
	Medical Officers ...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...
	Non-Commissioned Officers	26	1	1	3·8	3·8	100·0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	26	1	1	3·8	3·8	100·0
	Men ...	243	7	6	2·9	2·5	85·7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	243	7	6	2·9	2·5	85·7
	Women ...	14	2	1	14·3	7·1	50·0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	14	2	1	14·3	7·1	50·0
	Children ...	25	2	2	8·0	8·0	100·0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	25	2	2	8·0	8·0	100·0
Nusseerabad.	Officers ...	25	2	1	8·0	4·0	50·0	10	2	2	20·0	20·0	100·0	...	...	...	...	...	...	4	...	...	...	...	...	39	4	3	10·3	7·7	75·0
	Medical Officers ...	3	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	5	...	...	...	...	...
	Non-Commissioned Officers	61	...	...	...	...	...	238	15	10	6·3	4·2	66·7	...	...	...	...	...	...	23	1	...	4·3	...	...	84	1	...	1·2	...	...
	Men ...	830	25	20	3·0	2·4	80·0													91	3	...	3·3	...	...	1,159	43	30	3·7	2·6	69·9
	Women ...	65	8	7	12·3	10·8	87·5	14	4	4	28·6	28·6	100·0	...	...	...	...	...	...	12	1	1	8·3	8·3	100·0	91	13	12	14·3	13·2	92·3
	Children ...	99	4	4	4·0	4·0	100·0	11	...	...	...	...	...	...	...	...	...	...	...	12	1	...	8·3	...	...	122	5	4	4·1	3·3	80·0
Futtehgurh.	Officers ...	7	...	...	...	...	...	...	...	...	...	...	...	4	...	...	...	...	...	...	...	...	...	...	...	11	...	...	...	...	...
	Medical Officers ...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...
	Non-Commissioned Officers	26	...	...	...	...	...	...	...	...	...	...	...	25	...	...	...	...	...	...	...	...	...	...	...	51	...	...	...	...	...
	Men ...	230	11	4	4·8	1·7	36·3	...	...	...	...	...	...	164	1	1	0·6	0·6	100·0	...	...	...	...	...	...	394	12	5	3·0	1·3	41·7
	Women ...	9	1	1	11·1	11·1	100·0	...	...	...	...	...	...	13	...	...	...	...	...	...	...	...	...	...	...	22	1	1	4·5	4·5	100·0
	Children ...	17	...	...	...	...	...	...	...	...	...	...	...	11	...	...	...	...	...	...	...	...	...	...	...	28	...	...	...	...	...
Cawnpoor.	Officers ...	16	...	...	...	...	...	14	...	...	...	...	...	...	...	...	...	...	...	4	...	...	...	...	...	34	...	...	...	...	...
	Medical Officers ...	3	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	6	...	...	...	...	...
	Non-Commissioned Officers	947	37	24	3·9	2·5	64·9	220	10	7	4·5	3·2	70·0	...	...	...	...	...	...	83	1	1	1·2	1·2	100·0	1,250	48	32	3·8	2·6	66·7
	Men ...																														
	Women ...	50	5	3	10·0	6·0	60·0	19	...	...	...	...	...	...	...	...	...	...	...	14	...	...	...	...	...	83	5	3	6·0	3·6	60·0
	Children ...	64	2	1	3·1	1·5	50·0	19	...	...	...	...	...	...	...	...	...	...	...	10	...	...	...	...	...	93	2	1	2·2	1·1	50·0
Allahabad.	Officers ...	21	1	1	4·8	4·8	100·0	...	...	...	...	...	...	4	...	...	...	...	...	4	...	...	...	...	...	29	1	1	3·4	3·4	100·0
	Medical Officers ...	2	...	...	...	...	...	...	...	...	...	...	...	1	1	...	100·0	100·0	...	1	...	...	...	...	...	4	1	...	25·0	...	...
	Non-Commissioned Officers	100	4	...	4·0	...	...	...	...	...	...	...	...	187	3	2	...	...	...	95	1	1	...	...	...	100	4	...	4·0	...	...
	Men ...	888	25	19	2·8	2·1	76·0	...	...	...	...	...	...													1,170	29	22	2·5	1·9	75·9
	Women ...	29	1	1	3·4	3·4	100·0	...	...	...	...	...	...	12	...	...	...	...	...	17	...	...	...	...	...	58	1	1	1·7	1·7	100·0
	Children ...	31	2	2	6·5	6·5	100·0	...	...	...	...	...	...	13	...	...	...	...	...	18	...	...	...	...	...	62	2	2	3·2	3·2	100·0
Grand Total.	Officers ...	251	9	6	3·6	2·4	66·7	86	6	4	7·0	4·6	66·7	21	...	...	...	...	...	90	4	3	4·4	3·4	75·0	448	19	13	4·2	2·9	68·4
	Medical Officers ...	49	...	...	...	...	...	11	1	...	9·1	...	...	6	1	...	16·7	...	...	18	...	...	...	...	...	84	2	...	2·4	...	...
	Non-Commissioned Officers	1,005	130	81	12·9	8·1	62·3	181	17	13	9·4	7·2	76·5	66	...	...	...	...	...	229	11	7	4·8	3·1	63·6	1,481	158	101	10·7	6·8	63·9
	Men ...	10,807	1,243	784	11·5	7·0	63·1	2,060	119	75	5·8	3·6	63·0	1,027	27	23	2·6	2·2	85·2	1,835	107	59	5·8	3·2	45·1	15,729	1,496	941	9·5	6·0	62·9
	Women ...	658	100	60	15·2	9·1	60·0	117	8	6	6·8	5·1	75·0	48	3	3	6·2	6·2	100·0	268	10	6	3·7	2·2	60·0	1,091	121	75	11·1	6·9	62·0
	Children ...	897	108	83	12·0	9·3	76·9	134	7	4	5·2	3·0	57·1	42	1	1	2·4	2·4	100·0	354	17	13	4·8	3·7	76·5	1,427	133	101	9·2	6·9	75·9
	Total ...	13,667	1,590	1,014	11·6	7·3	63·8	2,589	158	102	6·1	3·9	64·6	1,210	32	27	2·6	2·2	84·4	2,794	149	88	5·3	3·1	59·1	20,260	1,929	1,231	9·5	6·1	63·8

368. The figures given in this Table for the Bengal Presidency are founded upon the Tabular Returns prepared in the Office of the Medical Board, published in the Indian Annals of Medical Science for October 1856. The results shown for the European Troops agree very nearly with those given by Dr. Hugh Macpherson in his "Analysis of the Later Medical Returns of European Troops serving in the Bengal Presidency." According to Dr. Macpherson's Tables, the average annual number of admissions for Cholera between 1817 and 1854 was 29 per 1,000 men, and the average annual number of deaths was 10 per 1,000.

The figures for Madras are derived from Dr. Balfour's "Statistics of Cholera."* Their accuracy is more doubtful. According to Dr. Ewart's Tables,† the average annual number of admissions for Cholera among the European Troops in the Madras Presidency, between 1829 and 1852, was 20 per 1,000 men, and the number of deaths, 7 per 1,000. According to the same authority, among the European Troops in the Bombay Presidency, between 1818 and 1854, the average annual number of admissions for Cholera per 1,000 men was 26, and the number of deaths per 1,000 was 9, while among the Native Troops for the same period the numbers of admissions and deaths were respectively 10 and 3 per 1,000.

These figures appear to show conclusively that the liability of the European Soldiers to the attack of Cholera has been far greater in India than that of the Native Troops. Admitting that the latter, consisting, as they do, of picked men, generally in the prime of life, and living under comparatively good sanitary conditions, may probably be less subject to attack than the mass of their countrymen, we cannot doubt that if a similar comparison could be made between the liability to Cholera of the European Troops and that of the general Native population, similar results would be exhibited.

It will be observed from the above Table that this comparative immunity to attack does not in any way apply to the prisoners in Jails, who were only slightly less liable to the disease than the European Soldiers. We have not been able to examine the details upon which the Table is based, and it is possible that the results shown for the Jails may not be strictly comparable with those for the European and Native Troops, because many of the Jails are situated in parts of Bengal where Cholera is extremely prevalent, while the bulk of the Army has been stationed in the Upper Provinces. All the information, however, which we have been able to obtain, tends to show that this greater liability of prisoners to be attacked by Cholera is a fact of general applicability throughout this Presidency.

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* Madras.—1849.

† Vital Statistics of the Armies in India, p. 147.

369. The following Table (No. II), founded upon information supplied to us by Dr. Murray, Deputy Inspector General of Hospitals, illustrates these facts very clearly for the station of Agra. It shows the comparative mortality from Cholera among the European and Native Troops and the prisoners in Jail for each of the years since 1837 in which the disease has been more than commonly prevalent :—

TABLE II.

Showing the Mortality from Cholera, for the periods stated, among the European and Native Troops, and Prisoners in Jail, at Agra.

Year.	European Artillery.			European Infantry.			Native Troops.			Jail.		
	Strength.	Deaths from Cholera.	Percentage Deaths to Strength.	Strength.	Deaths from Cholera.	Percentage Deaths to Strength.	Strength.	Deaths from Cholera.	Percentage Deaths to Strength.	Strength.	Deaths from Cholera.	Percentage Deaths to Strength.
1837 ...	208	5	2·4	767	2	0·1	3,092	2	0·7	...	...	...
1838 ...	196	...	...	687	5	0·7	3,099	42	1·4	1,318	71	5·3
1843 ...	173	5	2·9	1,003	49	4·9	2,942	6	0·2	1,047	28	2·7
1851 ...	95	1	1·1	1,048	6	0·6	3,048	1	...	2,939	80	2·7
1856 ...	95	14	14·7	920	81	8·9	2,942	34	0·9	3,704	239	6·5
1860 ...	174	7	4·0	1,047	52	5·0	1,419	18	1·3	1,997	175	8·8
1861 ...	111	3	2·7	1,042	64	6·1	569	5	0·9	2,960	63	2·1
Total...	1,052	35	3·3	6,514	259	4·0	17,111	108	0·6	13,965	656	4·7

370. These results agree in all their main points with the facts observed during the late Epidemic. This will be shown by the following Table (No. III), which exhibits the mortality among the European and Native Troops and the prisoners in Jails at each station in which it was possible to make a fair comparison :—

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TABLE III.

Showing the comparative Mortality from Cholera, during the Epidemic of 1861, *among the European and Native Troops, and Prisoners in Jails, at the Stations named below :—*

STATION.	EUROPEAN TROOPS.						NATIVE TROOPS.						JAILS.					
	ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.		
	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.
UMBALLA ...	1,770	71	52	4·0	2·9	73·2	720	4	2	0·6	0·3	50·0	800	27	18	3·4	2·3	66·7
DELHI ...	1,267	120	52	9·5	4·1	43·3	1,175	28	9	2·4	0·8	32·1	464	35	19	7·5	4·1	54·3
MEERUT ...	2,751	117	86	4·3	3·1	73·5	623	4	2	0·6	0·3	50·0	2,533	664	344	26·2	13·6	51·8
BAREILLY ...	1,166	6	5	0·5	0·4	83·3	752	......	......	......	......	......	1,400	12	5	0·9	0·4	41·7
AGRA ...	1,153	109	67	9·5	5·9	61·5	662	15	5	2·3	0·8	33·3	2,960	173	63	5·8	2·1	36·4
FUTTEHGURH	445	12	5	2·7	1·1	41·7	349	1	......	0·3	......	......	480	60	22	12·5	4·6	36·7
ALLAHABAD	1,270	33	22	2·6	1·7	66·7	490	3	3	0·6	0·6	100·0	1,670	66	26	5·8	1·5	39·4
Total ...	9,822	468	289	4·8	2·9	61·8	4,771	55	21	1·2	0·4	38·2	10,307	1,037	497	10·1	4·8	47·9
									Deducting MEERUT ...				7,774	373	153	4·8	2·0	41·0

371. It does not follow that the comparative immunity of the Native population arises from any special susceptibility of the European constitution to this particular disease. It will be observed from Table I that the proportion which the number of deaths from Cholera among the European Soldiers bears to the number of deaths from the same cause among the Natives, does not differ in any important degree from the proportion which holds good for the deaths from all causes. If the European Soldier is five times more liable to Cholera than the Sepoy, the same is true for other diseases also.

372. We find, too, that the extreme liability to Cholera is not shared by the rest of the European community. During the late Epidemic, the escape of the non-Military European population was almost complete, and the Officers of the Army suffered, as they have done on former occasions, comparatively little. Although the greater susceptibility of Europeans generally to the attack of Cholera may be considered doubtful, it must at the same time be admitted that evidence is not wanting to support the belief, which is a very common one, that such susceptibility is a fact. The higher proportion of deaths to cases treated, which, as we shall again notice, prevails among the Europeans, seems also to point to this conclusion.

The figures given in Table I to show the mortality from all causes among the prisoners in the Jails of the Bengal Presidency are too high for the Jails in the North-Western Provinces, but we cannot give the correct numbers. So far as the data to which we have had access justify conclusions, they seem to show that the difference between the rate of mortality among the prisoners in the Jails of Northern India, and that which prevails among the Native population generally, is much greater in the case of Cholera than it is for other diseases. This extreme liability to the attack of Cholera is remarkable. The sanitary condition of the Jails is usually incomparably better than that of the towns and villages. The conservancy arrangements are generally excellent, and every possible care is taken to preserve perfect cleanliness throughout the whole of the buildings. The diet of the prisoners, although deficient in variety, is superior in most respects to that of the mass of the Native population. It deserves special notice that the prisoners are the only class of the Native community who live under conditions which at all resemble those of the European Soldiers. They are brought together in barracks, and, as Dr. Murray remarks, latrines are always provided for their use. These, it must be added, are almost always kept very clean, and they offer in this respect a complete contrast to those of our Military stations. The Native Troops, on the other hand, who suffer,

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comparatively speaking, so little from Cholera, live generally in small separate huts, and hardly ever in barracks, and latrines are seldom provided for them. There are doubtless other causes which operate in the case both of the European Soldiers and the prisoners to make them more than commonly liable to the attack of disease generally; but, upon the whole, the facts that have been ascertained tend to render it probable that the peculiar susceptibility to Cholera greatly depends in both cases upon the special manner in which the men are congregated together.

373. Regarding the comparative liability to Cholera of other classes of the Native population in the North-Western Provinces, there are no facts on which general conclusions can be based. In Calcutta we find from Dr. Macpherson's Tables that the mortality from Cholera among the Mohammedans was smaller than among the Hindoos, the number of deaths from Cholera per 1,000 deaths from all causes being in the former case 379, and in the latter case 339. In Madras the Hindoos are said to suffer from Cholera much less than the Mohammedans, while in Bombay they are said to suffer more. Little stress can be laid upon this.

374. We proceed to state the results of our investigations into this branch of the subject with respect to the several classes of which each branch of the Army consists. There are seldom satisfactory data available which give the means of comparing the results of our present inquiry with those observed during former outbreaks of Cholera, and conclusions based upon the facts that have been ascertained regarding a single Epidemic must necessarily be accepted with caution. We trust that efforts may hereafter be made for systematically observing and placing upon record all facts of interest regarding these violent outbreaks of disease.

The following Tables have been prepared to show the absolute and comparative virulence of Cholera among Officers, Medical Officers, Non-Commissioned Officers, Men, Women, and Children, for each branch of the Service separately, at each station attacked by the Epidemic, and to exhibit the apparent influence produced by differences of sex, age, length of service, habits, and other predisposing causes.

Before stating the conclusions which appear to be authorized by these Tables, we desire to notice a few points of much importance.

Special caution necessary in dealing with figures.

375. In dealing with figures such as these, a special caution is necessary. It frequently happens that the results which appear upon the surface are very far from being correct, and an imperfect appreciation of this truth often leads to

false conclusions. People generally are too much in the habit of considering that the average or mean results shown in such Tables have necessarily a real signification and represent facts. Very often, although the assertion may seem paradoxical, this is far from being the case. An average or a mean is strictly an abstract arithmetical idea, and in that sense every such mean, properly calculated, is correct; but when we come to apply this abstract idea to facts, and to inquire its signification, we shall see that it may, in some cases, have no tangible or useful meaning whatever. Thus, if we had before us a hundred objects, one of which was 1,001 feet high, while the remaining ninety-nine were each 1 foot high, we should say quite correctly in one sense that the average height of the whole was 11 feet. But, in fact, the height of none of the objects would be at all near to 11 feet, and the arithmetical idea would not have any useful significance. It would, in truth, confuse us, and lead us wrong, instead of assisting our apprehension of the facts. In the example just given, a little consideration will show that the series of facts are not properly comparable; that we have one series of objects of one sort, and another of another sort; and that although we may arbitrarily, and in an abstract way, talk of them as a whole, yet in matter of fact they are distinct, and cannot properly be viewed together in respect of their height,—the sense in which we have been considering them. The only legitimate way of dealing with such an assemblage of facts is to consider them in groups that are properly comparable. In very many cases the difference between false and true induction lies in our success in making such distinctions properly; and where the disturbing causes of the phenomena under consideration are so obscure, and have been so imperfectly observed and recorded as in the case of this Epidemic, the difficulties in the way of arriving at a correct result are immensely aggravated. It is further proper to remark that the weight, or the degree of confidence that we may fairly attach to any average or mean, primarily depends on the number of individual observations or cases from which it is derived, although the nature of the relation between the possible causes of error as to frequency and amount, and the number of cases, is also of much importance. Thus, in dealing with these Returns, which exhibit certain average percentages of disease and death, in bodies of men greatly varying in numbers, we shall find that the value of the figures is very different in different cases. These Returns are liable to error in many ways, either from mere numerical or clerical mistakes, or from mistakes in identifying the disease, and in ascertaining that it really occurred in each instance in which it was recorded. In addition to such errors, there will be an actual irregularity in the number of cases, and an

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indefiniteness in the activity of the disease. The progress of a disease does not take place at a rigorously equable rate, nor is it to be expected that the manner in which it affects a body of men will be mathematically constant from man to man, or strictly comparable from day to day, or from place to place. It is only within the range of such irregularities which in scientific language would be called *accidental,* that we can expect to represent any natural phenomena by figures, or, in the present instance, to exhibit, in a numerical form, the progress of the Epidemic which we are considering.

If we suppose the case of a body of 10,000 men, in which 1,000 cases of a particular disease occur, we shall say that the percentage of this particular disease is 10. It will be evident that a small amount of actual error or of accidental irregularity will here not very seriously affect our numerical results. For suppose that, on the whole, from all causes of inaccuracy, there were an actual error of 20 cases, or 2 per cent., so that instead of 1,000 cases the correct number should have been 980, it would then follow that the percentage, instead of being 10, as before supposed, should be reduced to 9·8. But if, instead of 10,000 men, we have to deal with a body of 100 men only, the result would be very different. Supposing that we had the same amount of disease, that is, 10 per cent., or 10 actual cases, and again supposing the general chance of error to be the same as before, that is, 2 per cent. on 10 cases, we shall have an error of only 0·2 cases. But it is obvious that any error must, in the nature of things, involve at least one case of disease. Further, since many causes of error are not in any way dependent on the number of cases of disease, and are so far absolute, the actual number of erroneous entries for the small number of cases might in fact readily amount to any small absolute integral number, say 2 or 3. Now, if such errors were corrected, the result would be to reduce the actual number of cases from 10 to say 7, and the percentage of disease in like manner from 10 to 7. Therefore, we infer that while a certain amount of error or irregularity would, in the case of the larger body, affect the calculated averages only to the extent of one or two-tenths per cent., a similar amount of error in the case of the smaller body might cause variations of two or three per cent.; or, in other words, that the value of the former averages would be ten times as great as the latter, and that the irregularities in the averages for the smaller body would probably be ten times as great as for the larger.

It will of course be understood that the above figures are merely illustrative; but there is reason to think that the irregularities actually introduced into the calculations by such causes as those which we have mentioned are often larger than those that have been now assumed for

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the purpose of explanation. Practical examples of the truth of these remarks may be seen in many of the Tables that follow. Disregard of such considerations in dealing with figures constantly leads people to false conclusions, and the practical results of these misconceptions are often very mischievous. Bearing this in mind many of the facts shown in the following Tables will be found to possess a high degree of interest, and notwithstanding all the causes of irregularity which we have noticed, the general consistency of the results is remarkable and important.

376. Table No. IV shows the comparative and absolute virulence of the Epidemic at each station, among each class of the European Troops that was attacked. We have now to inquire what are the conclusions which we can derive from these figures.

Comparative virulence of Cholera among various branches of the Service.

377. One of the most obviously apparent results is that the Infantry have suffered far more severely than the other branches of the Service. The total average mortality in the Infantry is shown to have been about double that which occurred in the Cavalry and Bengal Artillery, and more than three times that in the Royal Artillery. If this be the actual fact, the result is one of high importance, and it is necessary that there should be no misapprehension of the truth.

In looking at the details for each station, given in the Table IV, it becomes evident that the total averages have been affected to an excessive degree by the great mortality which occurred among the Troops at Meean Meer and at Morar, and as the principal loss at those stations fell upon the Infantry, it is in the figures showing the mortality of this branch of the Service that the disturbance of the general mean results is chiefly seen. It will be evident to every one who has looked into the facts which have been stated in our narrative, that the excessive aggravation of the disease at Meean Meer and Morar was due to certain special causes, the principal of which was mismanagement of the extremest kind. Applying, therefore, the principle that has just been laid down, we conclude that extraordinary causes having been in operation at Meean Meer and Morar, and not in the other stations, the first series of facts is not fairly comparable with the second series, and that they must therefore be separated. Although special recognizable causes have doubtless affected the mortality in other places, it is not apparent that they have been of such a peculiar and unusual character as to make it necessary that we should for our present purpose consider them, nor do we find that they are of an importance which affects the general averages.

378. Rejecting, therefore, the figures for Meean Meer and Morar, we have the results shown in the following Table (No. V) :—

TABLE IV.

Showing the comparative virulence of Cholera during the Epidemic of 1861, at each Station, among the European Troops, Officers, Men, Women, and Children, for each branch of the Service.

STATION.	RANK, &c.	INFANTRY.						CAVALRY.						ROYAL ARTILLERY.						BENGAL ARTILLERY.						TOTAL.					
		ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.		
		Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.
MEEAN MEER.	Officers ...	32	3	1	9·4	3·1	33·3	8	...	...	...	...	...	2	...	...	...	...	...	7	...	...	...	...	...	49	3	1	6·1	2·0	33·3
	Medical Officers ...	12	...	...	...	...	...	2	1	...	50·0	...	...	1	...	...	...	...	...	3	...	...	...	...	...	18	1	...	5·6	...	...
	Non-Commissioned Officers	138	70	46	50·7	33·3	65·7	34	6	5	17·6	14·7	83·3	183	19	16	10·4	8·7	84·2	70	5	5	7·1	7·1	100·0	242	81	56	34·3	23·1	69·2
	Men ...	1,410	652	378	46·2	26·8	58·0	189	37	26	19·6	13·8	70·3	...	...	...	...	...	...	150	17	10	11·3	6·7	58·8	1,932	725	430	37·5	22·3	59·3
	Women ...	79	33	18	41·8	22·8	54·6	4	...	...	...	...	...	7	2	2	28·6	28·6	100·0	33	1	1	3·0	3·0	100·0	123	36	21	29·3	17·1	58·3
	Children ...	99	34	26	34·3	26·3	76·5	3	...	...	...	...	...	7	1	1	14·3	14·3	100·0	46	3	1	6·5	2·2	33·3	155	38	28	24·5	18·1	73·7
AMRITSUR.	Officers ...	10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5	...	...	...	...	...	15	...	...	...	...	...
	Medical Officers ...	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...	...	...	7	...	...	...	...	...
	Non-Commissioned Officers	44	2	2	4·5	4·5	100·0	...	...	...	...	...	...	...	...	...	...	...	...	16	...	...	...	...	...	60	2	2	3·3	3·3	100·0
	Men ...	390	45	36	11·5	9·2	80·0	...	...	...	...	...	...	...	...	...	...	...	...	91	4	3	4·4	3·3	75·0	481	49	39	10·2	8·1	79·6
	Women ...	15	1	1	6·7	6·7	100·0	...	...	...	...	...	...	...	...	...	...	...	...	14	1	1	7·1	7·1	100·0	29	2	2	6·9	6·9	100·0
	Children ...	9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	18	...	...	...	...	...	27	...	...	...	...	...
UMBALLA.	Officers ...	19	...	...	...	...	...	16	...	...	...	...	...	...	...	...	...	...	...	9	...	...	...	...	...	44	...	...	...	...	...
	Medical Officers ...	3	...	...	...	...	...	3	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...	...	...	9	...	...	...	...	...
	Non-Commissioned Officers	89	3	3	3·4	3·4	100·0	72	3	2	4·2	2·8	66·7	...	...	...	...	...	...	237	...	...	...	...	...	161	6	5	3·7	3·1	83·3
	Men ...	790	58	42	7·3	5·3	72·4	582	7	5	1·2	0·9	71·4	...	...	...	...	...	...							1,609	65	47	4·0	2·9	72·3
	Women ...	39	3	2	7·7	5·1	66·7	27	...	...	...	...	...	...	...	...	...	...	...	26	...	...	...	...	...	92	3	2	3·3	2·2	66·7
	Children ...	57	9	8	15·8	14·0	88·9	28	1	1	3·6	3·6	100·0	...	...	...	...	...	...	39	...	...	...	...	...	124	10	9	8·1	7·3	90·0
DELHI.	Officers ...	20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	8	...	...	...	...	...	28	...	...	...	...	...
	Medical Officers ...	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	4	...	...	...	...	...
	Non-Commissioned Officers	91	14	7	15·4	7·7	50·0	...	...	...	...	...	...	...	...	...	...	...	...	26	5	2	19·2	7·7	40·0	117	19	9	16·2	7·7	47·4
	Men ...	1,014	81	37	8·0	3·6	45·7	...	...	...	...	...	...	...	...	...	...	...	...	136	20	6	14·7	4·4	30·0	1,150	101	43	8·8	3·7	42·6
	Women ...	72	14	7	19·4	9·7	50·0	...	...	...	...	...	...	...	...	...	...	...	...	28	4	1	14·3	3·6	25·0	100	18	8	18·0	8·0	44·4
	Children ...	84	14	5	16·7	5·9	35·7	...	...	...	...	...	...	...	...	...	...	...	...	36	2	2	5·6	5·6	100·0	120	16	7	13·3	5·8	43·8
MEERUT.	Officers ...	18	...	...	...	...	...	20	3	2	15·0	10·0	66·7	6	...	...	...	...	...	35	3	2	8·6	5·7	66·7	79	6	4	7·9	5·3	66·7
	Medical Officers ...	2	...	...	...	...	...	2	...	...	...	...	...	2	...	...	...	...	...	3	...	...	...	...	...	9	...	...	...	...	...
	Non-Commissioned Officers	96	2	2	2·1	2·1	100·0	75	8	6	10·7	8·0	75·0	41	...	...	...	...	...	57	...	...	...	...	...	269	10	8	3·7	3·0	80·0
	Men ...	1,016	30	24	3·0	3·9	80·0	586	32	23	5·5	3·9	71·9	319	4	4	1·3	1·3	100·0	561	41	27	2·4	1·6	65·9	2,482	107	78	4·3	3·1	72·9
	Women ...	81	5	4	6·2	4·9	80·0	32	2	2	6·3	6·3	100·0	8	1	1	12·5	12·5	100·0	79	2	1	2·5	1·3	50·0	200	10	8	5·0	4·0	80·0
	Children ...	112	5	5	4·5	4·5	100·0	42	4	3	9·5	7·1	75·0	7	...	...	...	...	...	113	5	5	4·4	4·4	100·0	274	14	13	5·1	4·7	92·9
MORADABAD.	Officers ...	10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	10	...	...	...	...	...
	Medical Officers ...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...
	Non-Commissioned Officers	40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	40	...	...	...	...	...
	Men ...	425	2	2	0·4	0·4	100·0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	425	2	2	0·4	0·4	100·0
	Women ...	27	1	1	3·7	3·7	100·0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	27	1	1	3·7	3·7	100·0
	Children ...	27	1	1	3·7	3·7	100·0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	27	1	1	3·7	3·7	100·0
AREILLY.	Officers ...	23	...	...	...	...	...	...	...	...	...	...	...	5	...	...	...	...	...	...	...	...	...	...	...	28	...	...	...	...	...
	Medical Officers ...	4	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	5	...	...	...	...	...
	Non-Commissioned Officers	92	1	1	1·1	1·1	100·0	...	...	...	...	...	...	174	...	...	...	...	...	...	...	...	...	...	...	92	1	1	1·1	1·1	100·0
	Men ...	900	5	4	0·5	0·4	80·0	...	...	...	...	...	...		...	...	...	...	...	...	...	...	...	...	...	1,074	5	4	0·5	0·4	80·0
	Women ...	33	...	...	...	...	...	...	...	...	...	...	...	8	...	...	...	...	...	...	...	...	...	...	...	41	...	...	...	...	...
	Children ...	39	...	...	...	...	...	...	...	...	...	...	...	4	...	...	...	...	...	...	...	...	...	...	...	43	...	...	...	...	...
	Officers ...	...	...	...	...	...	...	18	1	...	5·5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	18	1	...	5·5	...	...
	Medical Officers ...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...
	Non-Commissioned Officers	...	...	...	...	...	...	245	18	4	7·3	1·6	22·2	...	...	...	...	...	...	106	...	...	...	...	...	351	18	4	5·1	1·1	22·2
	Men ...																														
	Women ...	...	...	...	...	...	...	21	2	...	9·5	...	...	...	...	...	...	...	...	5	...	...	...	...	...	26	2	...	7·7	...	...
	Children ...	...	...	...	...	...	...	31	2	...	6·4	...	...	...	...	...	...	...	...	6	...	...	...	...	...	37	2	...	5·4	...	...
	Officers ...	29	1	1	3·4	3·4	100·0	...	...	...	...	...	...	...	...	...	...	...	...	6	1	1	16·7	16·7	100·0	35	2	2	5·7	5·7	100·0
	Medical Officers ...	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	5	...	...	...	...	...
	Non-Commissioned Officers	113	9	5	8·0	4·4	55·6	...	...	...	...	...	...	...	...	...	...	...	...	19	...	...	...	...	...	132	9	5	6·8	3·8	55·6
	Men ...	929	92	59	9·9	6·3	64·1	...	...	...	...	...	...	...	...	...	...	...	...	92	8	3	8·7	3·3	37·5	1,021	100	62	9·8	6·1	62·0
	Women ...	65	7	2	10·7	3·1	28·6	...	...	...	...	...	...	...	...	...	...	...	...	15	...	...	...	...	...	80	7	2	8·8	2·5	28·6
	Children ...	76	3	3	3·9	3·9	100·0	...	...	...	...	...	...	...	...	...	...	...	...	31	2	1	6·5	3·2	50.0	107	5	4	4·7	3·7	80·0
	Officers ...	16	2	2	12·5	12·5	100·0	...	...	...	...	...	...	...	...	...	...	...	...	8	...	...	...	...	...	24	2	2	8·3	8·3	100·0
	Medical Officers ...	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	7	...	...	...	...	...
	Non-Commissioned Officers	89	24	14	27·0	15·7	58·3	...	...	...	...	...	...	...	...	...	...	...	...	18	...	...	...	...	...	107	24	14	22·4	13·1	58·3
	Men ...	795	173	129	21·8	16·2	74·6	...	...	...	...	...	...	...	...	...	...	...	...	193	12	8	6·2	4·1	66·7	988	185	137	18·7	13·9	74·0
	Women ...	80	19	12	23·8	15·0	63·2	...	...	...	...	...	...	...	...	...	...	...	...	25	1	1	4·0	4·0	100·0	105	20	13	19·0	12·4	65·0
	Children ...	158	32	26	20·3	16·5	81·3	...	...	...	...	...	...	...	...	...	...	...	...	25	4	4	16·0	16·0	100·0	183	36	30	19·7	16·4	83·3
WALIOR.	Officers ...	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5	...	...	...	...	...
	Medical Officers ...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...
	Non-Commissioned Officers	26	1	1	3·8	3·8	100·0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	26	1	1	3·8	3·8	100·0
	Men ...	243	7	6	2·9	2·5	85·7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	243	7	6	2·9	2·5	85·7
	Women ...	14	2	1	14·3	7·1	50·0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	14	2	1	14·3	7·1	50·0
	Children ...	25	2	2	8·0	8·0	100·0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	25	2	2	8·0	8·0	100·0
	Officers ...	25	2	1	8·0	4·0	50·0	10	2	2	20·0	20·0	100·0	...	...	...	...	...	...	4	...	...	...	...	...	39	4	3	10·3	7·7	75·0
	Medical Officers ...	3	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	5	...	...	...	...	...
	Non-Commissioned Officers	61	...	...	...	...	...	238	15	10	6·3	4·2	66·7	...	...	...	...	...	...	23	1	...	4·3	...	...	84	1	...	1·2	...	...
	Men ...	830	25	20	3·0	2·4	80·0							...	...	...	...	...	...	91	3	...	3·3	...	...	1,159	43	30	3·7	2·6	69·9
	Women ...	65	8	7	12·3	10·8	87·5	14	4	4	28·6	28·6	100·0	...	...	...	...	...	...	12	1	1	8·3	8·3	100·0	91	13	12	14·3	13·2	92·3
	Children ...	99	4	4	4·0	4·0	100·0	11	...	...	...	...	...	...	...	...	...	...	...	12	1	...	8·3	...	...	122	5	4	4·1	3·3	80·0
	Officers ...	7	...	...	...	...	...	...	...	...	...	...	...	4	...	...	...	...	...	...	...	...	...	...	...	11	...	...	...	...	...
	Medical Officers ...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...
	Non-Commissioned Officers	26	...	...	...	...	...	...	...	...	...	...	...	25	...	...	...	...	...	...	...	...	...	...	...	51	...	...	...	...	...
	Men ...	230	11	4	4·8	1·7	36·3	...	...	...	...	...	...	164	1	1	0·6	0·6	100·0	...	...	...	...	...	...	394	12	5	3·0	1·3	41·7
	Women ...	9	1	1	11·1	11·1	100·0	...	...	...	...	...	...	13	...	...	...	...	...	...	...	...	...	...	...	22	1	1	4·5	4·5	100·0
	Children ...	17	...	...	...	...	...	...	...	...	...	...	...	11	...	...	...	...	...	...	...	...	...	...	...	28	...	...	...	...	...
	fficers ...	16	...	...	...	...	...	14	...	...	...	...	...	...	...	...	...	...	...	4	...	...	...	...	...	34	...	...	...	...	...
	edical Officers ...	3	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	6	...	...	...	...	...
	on-Commissioned Officers	947	37	24	3·9	2·5	64·9	220	10	7	4·5	3·2	70·0	...	...	...	...	...	...	83	1	1	1·2	1·2	100·0	1,250	48	32	3·8	2·6	66·7
	en ...																														
	omen ...	50	5	3	10·0	6·0	60·0	19	...	...	...	...	...	...	...	...	...	...	...	14	...	...	...	...	...	83	5	3	6·0	3·6	60·0
	hildren ...	64	2	1	3·1	1·5	50·0	19	...	...	...	...	...	...	...	...	...	...	...	10	...	...	...	...	...	93	2	1	2·2	1·1	50·0
	icers ...	21	1	1	4·8	4·8	100·0	...	...	...	...	...	...	4	...	...	...	...	...	4	...	...	...	...	...	29	1	1	3·4	3·4	100·0
	dical Officers ...	2	...	...	...	...	...	...	...	...	...	...	...	1	1	...	100·0	100·0	...	1	...	...	...	...	...	4	1	...	25·0	...	...
	n-Commissioned Officers	100	4	...	4·0	...	...	...	...	...	...	...	...	187	3	2	...	...	...	95	1	1	...	...	...	100	4	...	4·0	...	...
	n ...	888	25	19	2·8	2·1	76·0	...	...	...	...	...	...													1,170	29	22	2·5	1·9	75·9
	men ...	29	1	1	3·4	3·4	100·0	...	...	...	...	...	...	12	...	...	...	...	...	17	...	...	...	...	...	58	1	1	1·7	1·7	100·0
	ldren ...	31	2	2	6·5	6·5	100·0	...	...	...	...	...	...	13	...	...	...	...	...	18	...	...	...	...	...	62	2	2	3·2	3·2	100·0
	cers ...	251	9	6	3·6	2·4	66·7	86	6	4	7·0	4·6	66·7	21	...	...	...	...	...	90	4	3	4·4	3·4	75·0	448	19	13	4·2	2·9	68·4
	ical Officers ...	49	...	...	...	...	...	11	1	...	9·1	...	...	6	1	...	16·7	...	...	18	...	...	...	...	...	84	2	...	2·4	...	...
	-Commissioned Officers	1,005	130	81	12·9	8·1	62·3	181	17	13	9·4	7·2	76·5	66	...	...	...	...	...	229	11	7	4·8	3·1	63·6	1,481	158	101	10·7	6·8	63·9
	...	10,807	1,243	784	11·5	7·0	63·1	2,060	119	75	5·8	3·6	63·0	1,027	27	23	2·6	2·2	85·2	1,835	107	59	5·8	3·2	45·1	15,729	1,496	941	9·5	6·0	62·9
	men ...	658	100	60	15·2	9·1	60·0	117	8	6	6·8	5·1	75·0	48	3	3	6·2	6·2	100·0	268	10	6	3·7	2·2	60·0	1,091	121	75	11·1	6·9	62·0
	dren ...	897	108	88	12·0	9·3	76·9	134	7	4	5·2	3·0	57·1	42	1	1	2·4	2·4	100·0	354	17	13	4·8	3·7	76·5	1,427	133	101	9·2	6·9	75·9
	Total ...	13,667	1,590	1,014	11·6	7·3	63·8	2,589	158	102	6·1	3·9	64·6	1,210	32	27	2·6	2·2	84·4	2,794	149	88	5·3	3·1	59·1	20,260	1,929	1,231	9·5	6·1	63·8

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TABLE V.

Showing the comparative virulence of Cholera, during the Epidemic of 1861, *among the European Troops,—Officers, Men, Women, and Children,—for each branch of the Service, omitting the Stations of Meean Meer and Morar.*

RANK, &c.	INFANTRY.						CAVALRY.						ROYAL ARTILLERY.						BENGAL ARTILLERY.						TOTAL.					
	ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.		
	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.
Officers	203	4	3	2·0	1·5	75·0	78	6	4	7·7	5·1	66·7	19	...	...	...	...	...	75	4	3	5·3	4·0	75·0	375	14	10	3·7	2·7	71·4
Medical Officers	31	...	...	...	..	...	9	...	...	...	...	...	5	1	...	20·0	...	...	14	...	...	...	...	..	59	1	...	1·7	...	...
Non-Commissioned Officers ...	778	36	21	4·6	2·7	58·2	147	11	8	7·5	5·0	72·7	66	...	...	...	...	...	141	6	2	4·3	1·4	33·3	1,132	53	31	4·7	2·7	58·5
Men	8,602	418	277	4·9	3·2	66·3	1,871	82	49	4·4	2·6	59·8	844	8	7	1·0	0·8	87·5	1,492	78	41	5·2	2·7	52·6	12,809	586	374	4·6	3·6	63·8
Women	499	48	30	9·6	6·0	62·5	113	8	6	7·1	5·3	75·0	41	1	1	2·4	2·4	100·0	210	8	4	3·8	1·9	50·0	863	65	41	7·5	4·8	63·1
Children	640	42	31	6·6	4·8	73·8	131	7	4	5·3	3·1	57·2	35	...	...	...	...	...	283	10	8	3·5	2·8	80·0	1,089	59	43	4·9	3·9	72·9
Total ...	10,753	548	362	5·1	3·4	66·1	2,349	114	71	4·9	3·0	62·3	1,010	10	8	1·0	0·8	80·0	2,215	106	58	4·8	2·6	54·7	16,327	778	499	4·8	3·1	64·1

379. If the results shown in this Table be compared with those at the end of Table IV, it will be seen how completely the whole aspect of the case has been altered by the omission of the Returns for Meean Meer and Morar. Thus, the total loss for the Infantry which was formerly shown as 7·3 per cent. is reduced to 3·4 per cent., and in the cases where the numbers are sufficiently large to make a satisfactory comparison possible, the extreme differences which were before noticed have disappeared.

To render, however, the comparison a really proper one between the virulence to the disease in any two classes, we must arrange the stations in groups, omitting from each group those places in which both classes were not present at the same time.

380. The following Tables (Nos. VI and VII) show the results of such a comparison between the virulence of Cholera in the Infantry and in the other branches of the Service. The details for each station can be ascertained by a reference to Table IV.

TABLE VI.

Showing the comparative virulence of Cholera, during the Epidemic of 1861, *among Infantry and Cavalry.*

Stations for which the comparison is made.	Rank, &c.	INFANTRY.						CAVALRY.					
		ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.		
		Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.
Umballa, Meerut, Nuseerabad & Cawnpoor	Non-Commd. Officers	246	5	5	2·0	2·0	100·0	147	11	8	7·5	5·0	72·7
	Men ...	3,583	150	110	4·2	3·1	73·3	1,626	64	45	3·9	2·8	70·3
	Women	235	21	16	8·9	6·8	76·2	92	6	6	6·6	6·6	100·0
	Children	332	20	18	6·0	5·4	90·0	100	5	4	5·0	4·0	80·0
	Total...	4,485	198	150	4·4	3·3	75·8	2,033	91	67	4·5	3·3	73·6

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TABLE VII.

Showing the comparative virulence of Cholera, during the Epidemic of 1861, among Infantry and Bengal Artillery.

Stations for which the comparison is made.	Rank, &c.	INFANTRY.						BENGAL ARTILLERY.					
		ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.		
		Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.
Amritsur, Delhi, Meerut, Agra, Nuseerabad, Cawnpoor, and Allahabad.	Non-Commd. Officers	505	31	16	6·1	3·2	51·7	141	6	2	4·3	1·4	33·3
	Men ...	6,014	335	219	5·6	3·6	65·4	1,149	78	41	6·8	3·6	52·6
	Women	416	44	27	10·6	6·5	61·4	205	8	4	3·9	2·0	50·0
	Children	532	39	28	7·3	5·3	71·8	277	10	8	3·6	2·9	80·0
	Total...	7,627	453	293	5·9	2·9	64·7	1,849	106	58	5·7	3·1	54·7

381. In these Tables the difference in favour of the Cavalry and Bengal Artillery against the Infantry has, in a great measure, disappeared. With regard to the men, this is completely the case, and this is the class for which the comparison can be made the most completely. Whether we take the percentage of deaths or of cases to strength as our standard of comparison, the result is the same.

It is not necessary to carry this comparison further. In most cases the numbers are not large enough to enable this to be done satisfactorily, and enough has been said to show the general results of the inquiry. The more minutely we examine the Tables, the more strongly is the conclusion forced upon us, that there is no reason to suppose that the men of any one branch of the Service were more generally liable to the attack of Cholera during the late Epidemic than those of any other branch. Any slight apparent differences which remain against the Infantry may probably be accounted for by the fact that their numbers were greater.

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So far as we have the means of judging, there is no reason to suppose that in this respect the late Epidemic has been at all peculiar.

Non-Commissioned Officers.

382. The Non-Commissioned Officers and men have suffered almost equally, the total percentage of deaths to strength among the former being 6·8 and among the latter 6·0. The proportion of deaths to cases does not seriously vary.

Officers.

383. The comparative escape of the Officers is, on the other hand, evident. The total percentage of deaths to strength among the Officers was 2·9, while it was 6·0 for the men, and if we omit two or three stations, as, indeed, we ought to do to make the comparison a fair one, the difference will be very much greater. This is quite in accordance with past experience. Thus, for the eight years ending 1853-54, the annual average percentage of deaths to strength from Cholera, among Officers attached to European Regiments in the Bengal Presidency, was 0·1, while among the men it was 7·0.* The comparative exemption enjoyed by Officers in the case of Cholera is apparently peculiarly great, although they suffer from nearly all other diseases far less than the men. Thus, the average annual percentage of deaths to strength from all causes among the Officers in the Bengal Presidency is about 3·1,† while among the men it is about 6·0.

The percentage of deaths to cases among the Officers during the late Epidemic was very high, but little stress can be laid upon this, because the total number of cases is so small. We have no means of making any comparison in this respect with the results of former experience.‡

Regarding Medical Officers we shall speak separately further on.

Influence of sex.

384. The influence of sex upon the liability to Cholera is not very apparent. The number of women is comparatively small, and the results are often very irregular. It will be seen that according to the general averages derived from the Returns of all the stations, the women suffered somewhat more severely than the men. This result is mainly caused by the virulence of the disease among the women at Delhi and Nuseerabad. If we omit these stations, the rates for the women fall a little below

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* Dr. Hugh Macpherson's Analysis of Later Medical Returns, &c.

† Sir J. R. Martin on the Influence of Tropical Climates, page 103.

‡ The figures given in Dr. Ewart's Vital Statistics to show the comparative mortality among Officers and men enable us to form no conclusion for the reason which we have just given in the case of our own inquiries, viz., that the numbers are too small.

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those for the men, while the rates for the men become somewhat higher. We have then the following results :—

...	Percentage Cases to Strength.	Percentage Deaths to Strength.
Men	10·1	6·5
Women	10·0	5·6

Upon the whole, there seems no reason to consider that there has been any appreciable difference either in the liability of women and of men to the disease, or in their chances of recovery when attacked. This result apparently agrees with that of past experience. For the four years ending 1853-54, the percentage of cases of Cholera to strength among men and women in the European Army in Bengal was the same, viz., 1·6, while the percentage of deaths to strength was 0·7 for the men and 0·5 for the women. This is entirely in accordance with the results obtained from observation of the Epidemics of Cholera that have occurred in England, where there appeared to be no difference in the liability of the two sexes.*

Children.

385. Similar results appear to be shown by the figures representing the cases and deaths among children. The Tables show no important difference in the liability of children and of adults to the attack of Cholera, although the proportion of deaths to attacks has been much higher among the former, 75·9 per cent. of the total number of cases having proved fatal. This result has been observed at almost every station, and it is believed that it is quite in accordance with former experience.

Influence of age.

386. The following Table† (No. VIII) shows the comparative virulence of the disease among men of different ages in each branch of the Service at various stations. We have not been able to obtain the necessary facts for every Regiment that was attacked, so that these details can only be given for a portion of the Force.

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* Report of Dr. Gull, drawn up for the Royal College of Physicians, page 154.

† Discrepancies exist between some of the figures in this and the following Tables and those given in Table IV and in Section I of this Report. This has arisen in consequence of the Tables having been prepared from different data. None of the discrepancies possess, however, any importance, nor is it worth while that we should point them out in detail.

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TABLE VIII.

Showing the comparative virulence of Cholera, during the Epidemic of 1861, *among European Soldiers of different ages, at various Stations, in each branch of the Service.*

INFANTRY.

STATION.	REGIMENT.	TOTAL						AGE.																							
								UNDER 25.						25 TO 30.						30 TO 35.						ABOVE 35.					
		ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.		
		Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.
MEEAN MEER ...	51st Regt. ...	999	477	253	...	...	...	474	233	114	...	...	...	373	179	103	...	...	...	96	45	24	...	...	...	56	20	12	...	...	...
	94th Regt. ...	535	230	171	...	...	...	288	135	103	...	...	...	154	62	45	...	...	...	47	19	13	...	...	...	46	14	10	...	...	...
	Total ...	1,534	707	424	...	...	...	762	368	217	...	...	...	527	241	148	...	...	...	143	164	37	...	...	...	102	34	22	...	...	...
AMRITSUR ...	94th Regt. ...	432	47	38	...	...	...	218	24	20	...	...	...	145	19	14	...	...	...	43	3	3	...	...	...	26	1	1	...	...	...
UMBALLA ...	89th Regt. ...	876	61	45	...	...	...	427	33	27	...	...	...	299	20	15	...	...	...	122	8	3	...	...	...	28	...	...	...	...	...
MEERUT ...	35th Regt. ...	1,156	32	26	...	...	...	612	14	10	...	...	...	365	6	5	...	...	...	125	5	5	...	...	...	54	7	6	...	...	...
AGRA ...	42nd Regt. ...	669	54	39	...	...	...	370	27	21	...	...	...	207	16	10	...	...	...	44	6	5	...	...	...	48	5	3	...	...	...
	107th Regt. ...	399	47	25	...	...	...	225	24	15	...	...	...	112	15	7	...	...	...	43	6	2	...	...	...	19	2	1	...	...	...
	Total ...	1,068	101	64	...	...	...	595	51	36	...	...	...	319	31	17	...	...	...	87	12	7	...	...	...	67	7	4	...	...	...
TOTAL INFANTRY ...		5,066	948	597	18·7	11·8	63·0	2,614	490	310	18·7	11·9	63·3	1,655	317	199	19·2	12·0	62·8	529	92	55	17·7	10·6	59·8	277	49	33	17·7	11·9	67·4

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CAVALRY.

MEEAN MEER ...	5th Cavalry ...	221	43	31	...	...	...	133	26	18	...	...	...	55	9	6	...	...	...	27	7	6	...	...	...	6	1	1	...	...	...
UMBALLA ...	7th Hussars ...	692	10	7	...	...	...	375	5	4	...	...	...	258	3	2	...	...	...	40	2	1	...	...	...	19	...	...	...	...	...
MEERUT ...	8th Hussars ...	664	40	29	...	...	...	350	24	17	...	...	...	210	12	8	...	...	...	54	2	2	...	...	...	50	2	2	...	...	...
TOTAL CAVALRY ...		1,577	93	67	5·9	4·2	72·1	858	55	39	6·4	4·6	70·9	523	24	16	4·6	3·1	66·7	121	11	9	9·1	7·4	98·2	75	3	3	4·0	4·0	100·0

ROYAL ARTILLERY.

MEEAN MEER ...	Royal Artillery	183	19	16	...	...	...	93	11	9	...	...	...	75	7	6	...	...	...	11	...	...	...	...	...	4	1	1	...	...	...
TOTAL ROYAL ARTILLERY ...		183	19	16	10·4	8·7	84·2	93	11	9	11·8	9·7	98·2	75	7	6	9·3	8·0	85·7	11	...	...	...	...	...	4	1	1	25·0	25·0	100·0

BENGAL ARTILLERY.

MEEAN MEER ...	Bengal Artillery	161	19	14	...	...	...	44	7	5	...	...	...	63	7	6	...	...	...	37	2	1	...	...	...	17	3	2	...	...	...
AMRITSUR ...	Ditto ...	104	4	3	...	...	...	33	...	...	...	...	...	21	...	...	...	...	...	26	4	3	...	...	...	24	...	...	...	...	...
DELHI ...	Ditto ...	162	25	8	...	...	...	79	9	3	...	...	...	53	15	4	...	...	...	12	...	...	...	...	...	18	1	1	...	...	...
MEERUT ...	Ditto ...	469	38	25	...	...	...	275	22	13	...	...	...	108	14	10	...	...	...	62	1	1	...	...	...	24	1	1	...	...	...
AGRA ...	Ditto ...	111	8	3	...	...	...	45	3	2	...	...	...	36	4	1	...	...	...	16	...	...	...	...	...	14	1	...	...	...	...
TOTAL BENGAL ARTILLERY ...		1,007	94	53	9·3	5·3	56·4	476	41	23	8·6	4·8	56·1	281	40	21	14·3	7·5	52·5	153	7	5	4·6	3·3	71·5	97	6	4	6·2	4·1	66·7
GRAND TOTAL ...		7,833	1,154	733	19·7	9·4	63·5	4,041	597	381	14·8	9·3	63·8	2,534	388	242	15·3	9·5	62·4	805	110	69	13·7	8·6	62·7	453	59	41	13·0	9·1	69·5

387. *Table No. IX gives the total results of the preceding Table, omitting the Infantry at Meean Meer.*

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TABLE IX.

Showing the comparative virulence of Cholera, during the Epidemic of 1861, *among European Soldiers of different ages, omitting the Infantry at Meean Meer.*

TOTAL						AGE.																							
						UNDER 25.						25 TO 30.						30 TO 35.						ABOVE 35.					
ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.		
Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.
6,299	447	309	7·1	4·9	69·1	3,279	229	164	7·0	5·0	71·6	2,007	147	94	7·3	4·7	63·9	662	46	32	7·0	4·8	69·6	351	25	19	7·1	5·4	76·0

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388. This Table appears to show that there has been very little difference in the virulence of the disease among men of various ages. The youngest and the oldest Soldiers have suffered the most, but very slightly so, and the impression left by the figures is, that the influence of age upon the liability to attack has hardly been appreciable. The percentage of deaths to cases appears, however, to have a decided tendency to increase with age.

389. No sufficient data are available to show how far these results are in accordance with the experience of past Epidemics. The following Table contains the results of Dr. Hugh Macpherson's inquiries into this subject for the four years ending 1853-54. So far as India is concerned, these are the only figures of any value that we have been able to find. For the purposes of comparison, we have inserted in this Table columns showing the apparent influence of age on the mortality from all causes, both in Bengal and at Home. These also are taken from Dr. Hugh Macpherson's Tables.*

TABLE X.

Showing the comparative Mortality from Cholera and all Causes among European Soldiers of different ages in Bengal for the four years ending 1853-54.

AGE.	BENGAL, 4 YEARS ENDING 1853-54.					UNITED KINGDOM, INFANTRY, 10 YEARS ENDING 1846.		
	Absolute Number.			Percentage.		Absolute Number.		Percentage.
	Strength.	Deaths from all Causes.	Deaths from Cholera.	Deaths from all Causes to Strength.	Deaths from Cholera to Strength.	Strength.	Deaths from all Causes.	Deaths from all Causes to Strength.
Under 20 ...	7,599	152	6	2·0	0·1	33,463	440	1·3
20 to 25 ...	27,341	1,201	153	4·4	0·6	57,291	1,019	1·8
25 to 30 ...	29,158	1,727	241	5·9	0·8	27,861	552	2·0
30 to 35 ...	14,390	825	137	5·7	1·0	22,323	442	2·0
Above 35 ...	5,596	333	50	5·9	0·9	17,261	370	2·1
Unknown ...	59	16						
Total ...	84,143	4,254	587	5·1	0·7	158,200	2,823	1·8

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* Analysis of Later Medical Returns, &c., Tables XV and XVI.

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According to this Table, the rates of mortality from Cholera and from all causes increase in both cases with age. These figures agree very well with those in the English Returns showing the mortality from Cholera at different ages during the Epidemic of 1848-49. The Diagrams in Dr. Gull's Report show clearly that "the curve indicating the mortality from Cholera rises as the curve for general disease rises; it falls with it, and subsequently rises by almost the same gradations."*

With regard to the European Troops in India, although the existing evidence is insufficient to authorize any positive conclusions, it is highly probable that the rule that holds good in England will be found to be also applicable here.

Influence of length of service in India.

390. Table No. XI shows the comparative virulence of Cholera among men who have served different periods of time in India.

391. Table No. XII gives the total results of the preceding Table, omitting the Infantry at Meean Meer.

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* Dr. Gull's Report, Royal College of Physicians, page 848.

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TABLE XI.

Showing the comparative virulence of Cholera, during the Epidemic of 1861, *among European Soldiers at various Stations, according to the length of their Service in India.*

INFANTRY.

STATION.	REGIMENT.	TOTAL.						INDIAN SERVICE.																													
								UNDER 2 YEARS.						2 TO 4 YEARS.						4 TO 6 YEARS.						6 TO 10 YEARS.						ABOVE 10 YEARS.					
		ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.		
		Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.
MEEAN MEER	51st Regt. ...	999	477	253	...	...	...	64	40	24	...	...	...	832	390	194	...	...	...	30	20	17	...	...	...	20	9	5	...	...	...	53	18	13	...	...	...
	94th Regt. ...	535	230	171	...	...	...	69	33	29	...	...	...	384	163	118	...	...	...	21	10	7	...	...	...	19	8	5	...	...	...	42	13	12	...	...	...
	Total ...	1,534	707	424	...	...	...	133	73	53	...	...	...	1,216	556	312	...	...	...	51	30	24	...	...	...	39	17	10	...	...	...	95	31	25	...	...	...
AMRITSUR ...	94th Regt. ...	432	47	38	...	...	...	15	2	2	...	...	...	380	45	36	...	...	...	11	...	...	...	...	...	9	...	...	...	...	...	17	...	...	...	...	...
UMBALLA ...	89th Regt. ...	876	61	45	...	...	...	132	16	11	...	...	...	610	44	33	...	...	...	124	1	1	...	...	...	3	...	...	...	...	...	7	...	...	...	...	...
AGRA ...	42nd Regt. ...	669	54	39	...	...	...	162	16	15	...	...	...	452	35	23	...	...	...	38	...	...	...	...	...	15	2	1	...	...	...	2	1	...	...	...	...
	107th Regt. ...	399	47	25	...	...	...	196	25	15	...	...	...	75	8	4	...	...	...	15	...	...	...	...	...	79	10	4	...	...	...	34	4	2	...	...	...
	Total ...	1,068	101	64	...	...	...	358	41	30	...	...	...	527	43	27	...	...	...	53	...	...	...	...	...	94	12	5	...	...	...	36	5	2	...	...	...
TOTAL INFANTRY ...		3,910	916	571	23·4	14·6	64·2	638	132	96	20·7	15·0	72·7	2,733	688	408	25·2	15·0	59·3	239	31	25	13·0	10·5	80·9	145	29	15	20·0	10·3	51·7	155	36	27	10·3	17·4	75·0

TABLE XI,—*continued.*

CAVALRY.

Station.	Regiment.	Total.						Indian Service.																													
								Under 2 years.						2 to 4 years.						4 to 6 years.						6 to 10 years.						Above 10 years.					
		Absolute Number.			Percentage.			Absolute Number.			Percentage.			Absolute Number.			Percentage.			Absolute Number.			Percentage.			Absolute Number.			Percentage.			Absolute Number.			Percentage.		
		Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.
MEEAN MEER	5th Cavalry ...	221	43	31	...	...	...	71	12	7	...	...	...	59	14	12	...	...	...	34	5	4	...	...	...	33	7	4	...	...	...	24	5	4	...	...	...
UMBALLA ...	7th Hussars ...	692	10	7	...	...	...	105	3	2	...	...	...	539	6	5	...	...	...	36	1	...	...	...	...	5	...	...	...	...	...	7	...	...	...	...	...
MEERUT ...	8th Hussars ...	664	40	29	...	...	...	198	19	12	...	...	...	401	20	16	...	...	...	12	...	...	...	...	...	11	1	1	...	...	...	42	...	...	...	...	...
TOTAL CAVALRY ...		1,577	93	67	5·9	4·2	72·1	374	34	21	9·1	5·6	61·8	999	40	33	4·0	3·3	82·5	82	6	4	7·3	4·9	66·7	49	8	5	16·3	10·2	62·5	73	5	4	6·9	5·5	80·0

ROYAL ARTILLERY.

MEEAN MEER	Royal Artillery	183	19	16	...	...	...	28	5	5	...	...	...	154	14	11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...
TOTAL ROYAL ARTILLERY ...		183	19	16	10·4	8·7	84·2	28	5	5	17·9	17·9	100·0	154	14	11	9·1	7·1	78·6	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...

BENGAL ARTILLERY.

IEEAN MEER	Bengal Artillery	161	19	14	...	...	...	6	3	2	...	...	...	88	9	8	...	...	...	8	1	1	...	...	...	25	2	1	...	...	...	34	4	2	...	...	...
MRITSUR ...	... ...	104	4	3	...	...	...	1	...	...	...	...	...	30	...	...	...	...	...	7	2	1	...	...	...	21	1	1	...	...	...	45	1	1	...	...	...
ELHI ...	... ...	162	25	8	...	...	...	56	8	4	...	...	...	23	5	2	...	...	...	21	3	...	...	...	...	33	6	1	...	...	...	29	3	1	...	...	...
IEERUT ...	... ...	469	38	25	...	...	...	247	27	19	...	...	...	123	9	5	...	...	...	21	1	...	...	...	...	39	...	...	...	...	...	39	1	1	...	...	...
GRA ...	... ...	111	8	3	...	...	...	31	4	2	...	...	...	30	3	1	...	...	...	4	...	...	...	...	...	17	...	...	...	...	...	29	1	...	...	...	...
TOTAL BENGAL ARTILLERY		1,007	94	53	9·3	5·3	56·4	341	42	27	12·3	7·9	64·3	294	26	16	8·8	5·4	61·5	61	7	2	11·5	3·3	29·6	135	9	3	6·7	2·2	33·3	176	10	5	5·7	2·8	50·0
GRAND TOTAL ...		6,677	1,122	707	16·8	10·6	63·0	1,381	213	149	15·4	10·8	70·0	4,180	768	468	18·4	11·2	61·0	382	44	31	11·5	8·1	70·5	329	46	23	14·0	7·0	70·5	405	51	36	12·6	8·9	70·6

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TABLE XII.

Showing the comparative virulence of Cholera, during the Epidemic of 1861, *among European Soldiers, according to the length of their Service in India, omitting the Infantry at Meean Meer.*

TOTAL.						INDIAN SERVICE.																													
						UNDER 2 YEARS.						2 TO 4 YEARS.						4 TO 6 YEARS.						6 TO 10 YEARS.						ABOVE 10 YEARS.					
ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.		
Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.
5,143	415	283	8·1	5·5	68·2	1,248	130	96	10·4	7·7	73·8	2,964	212	156	7·2	5·3	73·6	331	14	7	4·2	2·1	50·0	290	29	13	10·0	4·5	44·8	310	20	11	6·5	3·5	55·0

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392. We can base no conclusions upon the figures shown in this Table. The Soldiers whose period of service was the shortest apparently suffered the most. The proportion of deaths to strength falls from 7·7 per cent. among men of less than two years' Indian Service, to 3·5 per cent. among men who have served more than ten years. The means of comparing these results with those of past experience are still more imperfect in this case than in those which have been previously noticed, and in the absence of facts it is needless that we should say more. The proper investigation of this subject must be left to future observers. It will probably be found that the influence exercised by length of residence in India upon the liability to Cholera is as little important as that of the other predisposing causes that have been noticed.

Influence of habits.

393. The following Table (No. XIII) gives the result of our inquiries into the effect upon the liability to Cholera produced by different habits of life. The Returns that we have been able to obtain do not give the means of separating the men who usually drank Beer only from those who drank Spirits also; but the number of the former class is so small, that if we had been able to show them separately, there could have been no useful result. The columns which show the habits of the men can only be considered to give a rough approximation to the facts. The Regimental and Medical Officers who furnished to us the Returns from which this Table is constructed often attached very different meanings to the words "intemperate," "moderate," and "abstemious." There can be no doubt that the number of intemperate men was really much larger than this Table represents, and that many have been classed as moderate who had little claim to be called so. The numbers are in many cases too small to authorize conclusions, and the results for the various Regiments and stations are often very irregular.

394. Omitting, as in the former Tables, the Returns for the Infantry at Meean Meer, we have the total results shown in Table No. XIV.

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TABLE XIII.

Showing the comparative virulence of Cholera, during the Epidemic of 1861, *at various Stations, among European Soldiers of different habits, in each branch of the Service.*

INFANTRY.

Station.	Regiment.	TOTAL.						USUALLY DRANK.												HABITS.																	
								SPIRITS AND BEER.						WATER ONLY.						INTEMPERATE.						MODERATE.						ABSTEMIOUS.					
		ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.		
		Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.
MEEAN MEER	51st Regt.	999	477	253	...	...	...	997	477	253	...	...	...	2	...	...	...	...	...	33	20	12	...	...	...	882	400	212	...	...	...	84	57	29	...	...	...
	94th Regt.	535	230	171	...	...	...	518	219	160	...	...	...	17	11	11	...	...	...	29	13	12	...	...	...	478	200	142	...	...	...	28	17	17	...	...	...
	Total ...	1,534	707	424	...	...	...	1,515	696	413	...	...	...	19	11	11	...	...	...	62	33	24	...	...	...	1,360	606	354	...	...	...	112	74	46	...	...	...
AMRITSUR	94th Regt.	432	47	38	...	...	...	424	47	38	...	...	...	8	...	...	...	...	...	22	3	2	...	...	...	401	44	36	...	...	...	9	...	...	...	...	...
UMBALLA	89th Regt.	876	61	45	...	...	...	824	60	44	...	...	...	52	1	1	...	...	...	125	10	6	...	...	...	697	50	38	...	...	...	54	1	1	...	...	...
AGRA ...	42nd Regt.	669	54	39	...	...	...	648	52	39	...	...	...	21	2	...	...	...	...	25	1	1	...	...	...	619	51	38	...	...	...	25	2	...	...	...	...
	107th Regt.	399	47	25	...	...	...	389	45	24	...	...	...	10	2	1	...	...	...	41	4	1	...	...	...	344	40	22	...	...	...	14	3	2	...	...	...
	Total ...	1,068	101	64	...	...	...	1,037	97	63	...	...	...	31	4	1	...	...	...	66	5	2	...	...	...	963	91	60	...	...	...	39	5	2	...	...	...
TOAL INFANTRY	... ...	3,910	916	571	23·4	14·6	59·7	3,800	900	558	23·7	14·7	62·0	110	16	13	14·5	11·8	81·3	275	51	34	18·5	12·4	56·7	3,421	785	488	22·9	14·3	62·1	214	80	49	37·4	22·9	61·2

CAVALRY.

MEEAN MEER ...	5th Cavalry	221	43	31	...	...	...	205	40	29	...	...	...	16	3	2	...	...	...	30	7	5	...	...	...	175	33	24	...	...	...	16	3	2	...	...	...
UMBALLA.	7th Hussars	692	10	7	...	...	...	679	10	7	...	...	...	13	...	...	...	...	...	54	1	1	...	...	...	600	9	6	...	...	...	38	...	...	...	...	...
MEERUT ...	8th Hussars	664	40	29	...	...	...	653	38	27	...	...	...	11	2	2	...	...	...	33	3	2	...	...	...	620	35	25	...	...	...	11	2	2	...	...	...
TOTAL CAVALRY ...		1,577	93	67	5·9	4·2	72·0	1,537	88	63	5·7	4·1	71·6	40	5	4	12·5	10·0	80·0	117	11	8	9·4	6·8	72·7	1,395	77	55	5·5	3·9	71·4	65	5	4	7·7	6·2	80·0

ROYAL ARTILLERY.

MEEAN MEER...	Royal Arty.	183	19	16	...	...	...	183	19	16	...	...	...	...	...	...	...	...	...	25	5	4	...	...	...	158	14	12	...	...	...	..	...	...	...	...	...
TOTAL ROYAL ARTILLERY		183	19	16	10·4	8·7	84·2	183	19	16	10·4	8·7	84·2	...	...	...	...	...	...	25	5	4	20·0	16·0	80·0	158	14	12	8·9	7·6	85·7	...	...	...	...	...	...

BENGAL ARTILLERY.

MEEAN MEER...	Bengal Arty.	161	19	14	...	...	...	156	18	13	...	...	...	5	1	1	...	...	...	16	4	3	...	...	...	11	14	10	...	...	...	34	1	1	..	...	...
AMRITSUR	Ditto ...	104	4	3	...	...	...	96	4	3	...	...	...	8	...	...	...	...	...	10	2	2	...	...	...	85	2	1	...	...	...	9	...	...	...	...	...
DELHI ...	Ditto ...	162	25	8	...	...	...	134	23	7	...	...	...	28	2	1	...	...	...	13	10	4	...	...	...	121	13	3	...	...	...	28	2	1	...	...	...
MEERUT ...	Ditto ...	469	38	25	...	...	...	464	37	25	...	...	...	5	1	...	...	...	...	65	1	1	...	...	...	393	36	24	...	...	...	11	1	...	...	...	...
GRA ...	Ditto ...	111	8	3	...	...	...	111	8	3	...	...	...	...	...	...	...	...	...	17	2	...	...	...	...	87	6	3	...	...	...	7	...	...	...	...	...
OTAL BENGAL ARTY.		1,007	94	53	9·3	5·3	56·4	961	90	51	9·4	5·3	56·7	46	4	2	8·7	4·3	50·0	121	19	10	15·7	8·3	52·6	797	71	41	8·9	5·1	57·7	89	4	2	4·5	2·2	50·0
GRAND TOTAL ...		6,677	1,122	707	16·8	10·6	63·0	6,481	1,097	688	16·9	10·6	62·7	196	25	19	12·8	9·7	76·0	538	86	46	16·0	8·6	53·5	5,771	947	596	16·4	10·3	62·6	368	89	55	24·2	14·9	61·8

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TABLE XIV.

ng the comparative virulence of Cholera, during the Epidemic of 1861, *among European Soldiers of different habits, omitting the Infantry at Meean Meer.*

TOTAL.					USUALLY DRANK.												HABITS.																	
					SPIRITS AND BEER.						WATER ONLY.						INTEMPERATE.						MODERATE.						ABSTEMIOUS.					
bsolute umber.		Percentage.			Absolute Number.			Percentage.			Absolute Number.			Percentage.			Absolute Number.			Percentage.			Absolute Number.			Percentage.			Absolute Number.			Percentage.		
Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.
415	283	8·1	5·5	68·2	4,966	401	275	8·1	5·5	68·6	177	14	8	7·9	4·5	57·1	476	53	22	11·1	4·6	41·5	4,411	341	242	7·7	5·5	71·0	256	15	9	5·9	3·5	60·0

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395. These figures appear to show that, with respect to the liability to the attack of Cholera, sober habits are an advantage. Thus, while among the Spirit and Beer-drinkers the percentages of attacks and deaths to Strength were respectively 8·1 and 5·5, they were 7·9 and 4·5 among the men who drank water only. Comparing the other columns, we find that the abstemious had a very decided advantage over the intemperate, for the percentages of attacks and deaths to strength in the former case were 5·9 and 3·5, while in the latter case they were 11·1 and 4·6. Comparing the moderate and intemperate men, the percentages are respectively 7·7 and 5·5 for the former, and 11·1 and 4·6 for the latter. The percentage of deaths to cases was smaller among the intemperate than among the other classes, although their liability to attack was greater. If the figures really, in this respect, represent a fact, the only explanation that we can suggest is that the large quantities of opium and violent stimulants that are often administered during the attack may possibly, in some measure, be the cause. Men who have been accustomed to the excessive use of stimulants may be the better able to resist the effects of such treatment.

Too much stress must not be laid upon the results which are apparently shown by this Table. The numbers in some of the columns are evidently too small to authorize positive conclusions, and small alterations in the absolute numbers of cases and deaths would make great changes in the apparent results.

396. No means exist for comparing the results of this part of our inquiry with those of previous Epidemics. The subject has never been systematically investigated, and, so far as we have been able to discover, there are no data which can be considered to possess any real value. The predisposing influence of intemperance has been constantly asserted, and probably correctly, but the assertion has usually been made rather upon moral than upon scientific grounds.

European experience does not throw much light upon this question. It was found in England in 1849 that the mortality from Cholera usually reached its highest point on the days of the week immediately succeeding those on which wages were paid, and on which the amount of drunkenness was greatest, and it was therefore assumed that intemperance was a predisposing cause.* But, as Dr. Gull remarks, "it is difficult to estimate separately the various noxious influences which in large cities are naturally associated with intemperance."

397. With regard to the effect produced by differences or irregularities of diet, nothing can be said. There is a wide-spread belief, both

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* Vide Registrar General's Report on Cholera, 1849.

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among Europeans and Natives, that unwholesome watery vegetables, such as are common in India during the rainy season, are especially dangerous seasons of Epidemic Cholera. Whether this opinion appears to have any basis of fact, we have not been able to ascertain.

Medical Officers.

398. Tables IV and V show that the Medical Officers suffered very slightly during this Epidemic. They were 84 in number, and there were among them two cases of Cholera and no deaths. The numbers are too small to authorize us to base any conclusions upon them, but, so far as they go, these results are similar to those of former experience. It has been well established, both in this country and in Europe, that Medical men are exposed to no special danger of attack from their attendance on patients with Cholera.

Hospital Establishments.

399. The following Table shows the manner, so far as it has been ascertained, in which the Hospital Establishments were affected by the disease :—

TABLE XV.

Showing the cases of Cholera and the Deaths that occurred among the Hospital Establishments of the European Troops during the Epidemic of 1861.

Occupation.	Absolute Number.			Percentage.		
	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.
Subordinate Medical Officers ...	87	3	1	3·4	1·1	33·3
Native Menial Establishments ...	1,014	17	6	1·7	0·6	35·3

400. The Medical Subordinates thus appear to have shared the immunity of the Medical Officers. Regarding the Native Menial Establishments the facts are not clear. Cases of Cholera that occurred among them have probably not always been recorded, and there are no means of comparing their liability to attack with that of other classes of the Native population. Although it is evident that in comparison with the European Soldiers their escape may be called complete, it seems, upon the whole, probable that they suffered more than the Native population generally. There are no means of comparing these numerical results with those observed in other Epidemics.

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Virulence of Cholera among patients in hospital under treatment for other diseases.

401. Although the Hospital Establishments have thus generally escaped attack, the virulence of the disease among the patients under treatment for other diseases, and among Soldiers employed on duty in the hospitals, has been extreme. We have had to notice this fact prominently in our account of the Epidemic at almost every station between Lahore and Allahabad. The same facts have been so constantly observed, and the actual number of cases of Cholera which have apparently had their origin in the hospitals has been so great, that there are no circumstances connected with the late Epidemic which deserve to be more carefully investigated.

The following Table gives the means of comparing the virulence of the disease among the healthy men and among the hospital patients in most of the Regiments that were attacked. Some hospitals have necessarily been omitted from the Table on account of the want of proper data, but none of these omissions are important, and at no station do they affect the general result.*

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* There is one important omission, that of the hospital of the 51st Regiment at Meean Meer. This has been left out for the reasons explained in para. 38 of this Report. In wo or three cases, in consequence of obscurities in the Returns, the figures given in the Table represent the facts for a part only of the time during which the Epidemic prevailed.

TABLE XVI.

Showing the comparative virulence of Cholera among healthy men and patients in Hospital, under treatment for other diseases, during the Epidemic of 1861.

STATION.	REGIMENT.	HEALTHY STRENGTH.						PATIENTS IN HOSPITAL.					
		ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.		
		Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.
MEEAN MEER	5th Cavalry	187	40	29	21·4	15·5	72·5	13	3	2	23·1	15·4	66·7
„	Royal Artillery	160	14	12	8·8	7·5	85·7	14	5	4	35·7	28·6	80·0
„	Bengal Artillery	148	14	10	9·5	6·8	71·4	8	6	4	75 0	50·0	66·7
„	94th Regiment	371	231	160	62·3	43·1	69·3	34	14	11	41·2	32·4	78 6
FORT LAHORE	Bengal Artillery	51	1	...	2·0	...	...	3	1	1	33·3	33·3	100·0
AMRITSUR	94th Regiment	385	24	16	6·2	4·2	66·7	41	23	22	56·1	53·7	95·7
UMBALLA	89th „	788	46	34	5·8	5·1	73·9	83	15	11	18·1	13·3	73·3
„	7th Hussars	594	8	6	1·3	1·0	75·0	60	2	1	3 3	1·7	50·0
DELHI	82nd Regiment	843	68	32	8·1	3·8	47·1	95	11	7	12·6	7·4	58·3
MEERUT	35th „	990	23	19	2·3	1·9	82·6	117	9	7	7·7	6·0	77·8
„	8th Hussars	614	39	28	6·4	4·6	71·8	45	1	1	2·2	2·2	100 0
„	Bengal Artillery	526	27	18	5·1	3·4	66 7	89	14	9	15·7	10·1	64·3
BAREILLY	3rd Battalion Rifle Brigade	900	3	2	0·3	0·2	66·7	90	3	3	3·3	3·3	100·0
MUTTRA	20th Hussars	215	14	2	6·5	0·9	14·3	30	4	2	13·3	6·6	50·0
AGRA	42nd Regiment	568	24	17	4·2	2·9	70·8	68	17	15	25·0	22·1	88·2
„	107th „	336	28	12	8·3	3·6	42·9	50	5	4	10·0	8·0	80·0
„	Bengal Artillery	104	8	3	7·2	2·7	37·5	6					
MORAR	„ „	197	8	5	4·1	2·5	62·5	13	4	3	30 8	23·1	75·0
„	27th Regiment	724	158	110	21·8	15·2	69·6	74	15	13	20·3	17·6	86·7
FORT GWALIOR	52nd „	250	5	5	2·0	2·0	100·0	18	3	2	16·6	11·1	66·7
FUTTEHGURH	42nd „	239	7	1	2·9	0·4	14·3	16	4	3	25·0	18·8	75·0
CAWNPOOR	54th „	830	34	22	4·1	2·7	64·7	113	3	2	2·7	1·8	66·7
ALLAHABAD	90th „	879	18	11	2·0	1·3	61·1	96	11	10	11·4	8·3	72·7
	Total	10,899	842	554	7·7	5·1	65·8	1,176	173	137	14·7	11·6	79·2

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402. The results shown in this Table are so remarkably uniform that it is impossible to doubt that they have been due to powerful causes of general operation. In this respect these figures offer a remarkable contrast to those in most of the preceding Tables, the general tendency of which was to show that no predisposing circumstances had any appreciable effect upon the liability to Cholera. The virulence of the disease among the hospital patients was clearly more than twice as great as it was among the healthy strength of the Regiments.

403. We have stated in our narrative the reasons which have led us to consider that the Infantry Hospitals at Meean Meer and at Morar produced a frightful aggravation of the disease among the men generally. Whether this opinion be right or wrong, the rates of mortality at these two stations are so excessively high that they seriously alter the general result, and they ought to be omitted for the purposes of the present comparison. We shall then have the results shown in the following Table :—

TABLE XVII.

Showing the comparative virulence of Cholera among healthy men and patients in Hospital, under treatment for other diseases, during the Epidemic of 1861, *omitting the Infantry Regiments at Meean Meer and Morar.*

HEALTHY STRENGTH.						PATIENTS IN HOSPITAL.					
ABSOLUTE NUMBER.			PERCENTAGE.			ABSOLUTE NUMBER.			PERCENTAGE.		
Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Strengths.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.
9,804	453	284	4·7	2·9	62·7	1,068	144	113	13·5	10·6	78·5

404. The general character of the results shown in this Table agrees precisely with that of the results in Table XVI, but the liability of the hospital patients to the attack of Cholera is illustrated still more strongly. It places the matter forcibly before us to consider that if the healthy men shown in this Table had died at the same rate as the patients in hospital, there would have been among them 1,039 deaths instead of 284. The proportion of deaths to cases among the hospital patients is also extremely high, no less than 78·5 per cent. of the cases having proved fatal.

405. There appears reason for believing that the excessive virulence with which the hospitals have been attacked has not been a peculiarity of this Epidemic. We have been unable to obtain any numerical data, but this is the conclusion to which we have been led by Reports regarding previous outbreaks of Cholera in Northern India, and by inquiries from Medical Officers of great experience. It is possible that the liability of the inmates of the hospitals may on this occasion have been greater than usual, but the question seems to be only one of degree. We may give a few examples from the records of past Epidemics.

In his Report on the Epidemic of 1856 at Agra, Dr. Murray, now Deputy Inspector General of Hospitals, writes that "the proportion of patients in hospital and hospital attendants affected by the disease was great." In a Report regarding the severe Epidemic of Cholera which attacked the Troops in the Meerut Medical Circle in 1845, Dr. Wilkie, Deputy Inspector General of Hospitals, states that "many patients in all the European hospitals were attacked," and in 1856 at Meerut the same happened. Dr. Wilkie says, regarding the outbreak in the latter year, "the disease occurred among the sick in hospital as well as among the men who were in attendance on patients." In the Cholera Epidemic of 1860 the same occurred at Gwalior, Agra, and Muttra. At each of these stations "the first cases"—we quote from Dr. Murray's Report—"appeared in the hospitals, in patients suffering from other diseases. This gave the men an impression that the disease was connected with the hospitals. This induced an aversion to going there, till the disease could be no longer concealed,—till collapse supervened, after which treatment was often powerless."

These extracts might, if necessary, be made much more numerous. The evidence which they contain is quite as definite as almost any that we could quote from the Reports that have been submitted by Medical Officers regarding the late Epidemic. When we see that facts so remarkable have been often hardly noticed on this occasion, we cannot

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conclude, from the general absence of detail in Reports regarding former Epidemics, that similar facts were not equally prominent. Unless people are in the habit of dealing with figures such as these, of which we are now treating, they are very apt to overlook their real significance, and numbers which are absolutely large often have an exaggerated comparative importance given to them. Thus, for example, if people hear that among 2,000 men there have been 50 deaths from Cholera within a week, the impression is immediately conveyed to the mind that the mortality has been very great, but if they hear that among 100 men during the same time there have been three deaths, the fact produces little effect upon them, although the rate of mortality has been really higher in the latter case than in the former.

We learn from the Reports of the Royal College of Physicians that in England, where the subject was studied more carefully than it has been in India, the conclusion arrived at by the highest Authorities was "that the existence of other disease did not obviously predispose to an attack. Without inferring that those who laboured under previous disease enjoyed an immunity from an attack of the Epidemic, it would appear that they were not in any marked degree predisposed to it."* These results are supported by the experience of the London Hospitals.†

So far as we can judge from the very imperfect information that we have been able to obtain, the liability to attack of men not in hospital did not appear to be affected by their previous state of health. Out of 250 men attacked in barracks at various stations, during the late Epidemic, regarding whose cases the information is clearer than usual, we find that 150 are recorded to have been strong and healthy, with no tendency to disease. The remaining 100 men are said to have been of inferior constitution, and in many cases their general health was bad; but a large proportion of them were apparently not suffering from any actual illness when they were attacked by Cholera.

We have shown that the general liability to the disease among men, women, and children in all branches of the Service does not practically vary, and that it is very questionable whether age, or length of service or habits of life have produced any important effect. Judging from analogy, we might expect that previous state of health would not be a predisposing cause of much greater importance.

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* Dr. Gull's Report, p. 155.

† Dr. Baly's Report, p. 185. Dr. Gull's Report, p. 156. (Royal College of Physicians.)

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406. The following Table apparently tends to a similar conclusion :—

TABLE XVIII.

Showing the nature of the diseases from which patients in Hospital were suffering when attacked by Cholera.

Disease.	Total.	Died.	Recovered.	Percentage Deaths to Cases.
Fevers	54	44	10	80·0
Diseases of the Lungs ..	7	3	4	42·9
Diseases of the Liver ..	11	9	2	81·5
Dysentery	9	7	2	77·8
Diarrhœa	47	37	10	78·7
Venereal Diseases	28	23	5	82·1
Other Diseases	17	14	3	82·3
Total	173	137	36	79·2

407. This Table gives the detail of all the cases among hospital patients entered in Table XVI. To enable us to judge whether patients suffering from any particular diseases were especially susceptible to the attack of Cholera, it would be necessary to know the average number of patients under treatment for each disease during the whole Epidemic. This information we do not possess, but the facts shown in the above Table make it probable that the liability to attack depended very little upon the nature of the previous diseases from which the patients were suffering. The diseases to which the highest numbers in the Table are attached are those which are always the most prevalent during the rainy season.

408. The peculiar liability of the hospitals to the attack of Cholera is shown with almost equal clearness by the fact that in very many instances the first cases among the European Troops occurred in the hospitals. This happened, as our narrative has shown, at Amritsur, in the 94th Regiment ; at Umballa, in the 89th ; at Delhi, in the 82nd and in the Artillery; at Meerut, in the 35th and in the Bengal Artillery ; at Morar, in the Artillery ; and at Futtehgurh, Moradabad, and Bareilly.

409. With regard to the causes which have led to these remarkable results, we consider that the available facts are insufficient to authorize any positive conclusions. Upon the whole, it seems probable that the true explanation is not that which at first sight seems the most likely, but that the extreme liability of the patients in hospital to be attacked by Cholera depended mainly not upon their previous illness, but upon some special local conditions which fostered the propagation of the disease in the hospital buildings.

Cholera among Soldiers employed on duty in the hospitals.

410. This supposition is supported by the consideration that the facts which we have now been noticing represent very inadequately the actual virulence of Cholera in the hospitals. Our narrative will have shown that at many stations there was the strongest reason for believing that a large proportion of the cases which occurred among the healthy men had in reality their origin in the hospitals. Thus, at Meean Meer and Morar, although we cannot prove the fact by figures, it appears to us that there can be no doubt that the hospitals were the main causes of the frightful mortality that occurred. They evidently became infected to such a degree that it was almost literally death for men to enter them who were predisposed, as the Soldiers clearly were, to the attack of the disease.

Minute Returns were called for by our Commission, from which we had hoped to have been able to compare in a satisfactory manner the actual liability to Cholera of men employed in attending upon their sick comrades or on other duty in the hospitals, and of men not so employed. We regret that the Returns have been generally filled up so carelessly that we can place no confidence in the numerical results which they exhibit. But it seems to us impossible to doubt that the cases were extremely numerous in which men, previously healthy, contracted the disease in consequence of their exposure in the hospitals. Even if we omit the cases of the Infantry Regiments at Meean Meer and Morar, the circumstances were in this respect hardly less remarkable which we have recorded in our narrative of the Epidemic at Amritsur and Umballa, among the Artillery at Morar, and in the 42nd at Futtehgurh. When, indeed, we observe similar facts recurring so frequently, it is impossible to avoid the impression that the actual influence of the hospitals in the propagation of the disease may have been even greater than we suppose.

411. The evidence that has been produced, incomplete as it is admitted to be, renders it at least highly probable that the accumulation of Cholera patients in the same building leads to the accumulation of the

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poison in which the actual cause of Cholera consists. The uniformly striking results which, as our narrative shows, followed the abandonment of the hospital buildings when the disease had become virulent, point to the same conclusion. We may call attention in particular to the results obtained when the hospital was left by the Artillery at Morar and to the remarkable contrast between those results and those which followed the adoption of a totally different plan in the 27th Regiment at the same station. We may refer also to the account which we have given of the beneficial consequences of abandoning the hospitals at Amritsur, at Futtehgurh, and at Allahabad.*

412. These questions, of which we have now been speaking, are closely connected with those regarding the communicability of Cholera by human intercourse, which have been already noticed. The evidence, which proves the tendency of Cholera to attach itself to particular localities and to hang about particular buildings,—that it is, to use the words of Dr. Budd, "a disease which infects the ground"—goes very far also to establish the fact that the original cause of Cholera is a specific and communicable poison.

413. The reasons which have led to the general escape of the Medical Officers and Hospital Establishments must be left in doubt. But the fact that Cholera seldom attacked them does not affect the value of the positive evidence which has been brought to show that Cholera is a communicable disease. If the latter fact be proved, no other fact can contradict it. The conditions which Cholera requires for its propagation were evidently in these cases not present. Why they were not present, or what those conditions were, are questions not more obscure than many others that might be raised regarding the communication of diseases the contagious properties of which are admitted by every one. We may, however, draw, from the constant escape of the Medical Officers, the very satisfactory conclusion, which indeed was evident long before the late Epidemic, that strong as may be our conviction of the communicability of Cholera, it does not spread in the manner of some purely contagious diseases, and

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* *Note by the President of the Commission*, 1864.

The Commission has avoided in its Report the discussion of every theory. With reference to the special liability of patients and others in the hospitals to the attack of Cholera, which was one of the most strongly marked characteristics of this and of other Epidemics, I wish to call special attention to the valuable Memorandum by Dr. Budd, printed in the Appendix. Dr. Budd's remarks regarding the operation of tainted privies in disseminating the disease in Public Establishments appear to me to afford a very probable explanation of the remarkable circumstances that have been noticed in this part of the Report.

that, with proper precautions and under ordinary circumstances, there need be no apprehension of danger in attending upon the sick.*

414. In a few instances, among which the Infantry Hospitals at Meean Meer hold an unhappy pre-eminence, the general sanitary condition of the hospitals became, if we adopt the belief of those who consider that Cholera has its origin in such causes, bad enough to account for any extension of the disease within the hospital walls. "No stronger condemnation," writes Miss Nightingale, "of any hospital or ward could be pronounced than the simple fact that any zymotic disease has originated in it, or that such diseases have attacked other patients than those brought in with them."† The judgment of those who agree with the opinion which Miss Nightingale has recorded, that incapable management is the sole possible explanation of such circumstances, will be severe, indeed, upon the Regimental Hospitals during the late Epidemic.

It will be sufficiently understood, from what has already been said, that we think that this conclusion must only be accepted with an important reservation. We believe that in very many cases in which Cholera became concentrated in the hospitals, every possible precaution of an ordinary sanitary kind had been taken by the Medical Officers, and that if they nevertheless failed to prevent the extension of the disease in the hospitals, it was because a specific poison was present, which could be removed by no attention to the purity of the air, or to the cleanliness of the buildings. Some of the most fatal hospitals were those of which the sanitary condition seemed to have been best cared for.

But while it is only in a restricted sense that we can admit the truth of the opinion which Miss Nightingale has expressed, we agree entirely with the practical conclusion which she has laid down. We do not blame individuals for failing to carry out a system of sanitary perfection which we believe to be hardly possible, and which, if it were possible, would probably not be entirely successful, but at the same time we think it clear that no condemnation can be stronger than these hospitals deserve.

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* Some observers have considered that there is evidence to show that persons who have been frequently exposed to the influence of the cause in which Cholera has its origin are less liable to attack than persons suddenly and for the first time exposed to it. So long ago as 1820, in his Report regarding the first great Epidemic of Cholera which attracted attention in India, Dr. Jameson wrote as follows:—"Another curious circumstance in the economy of the disease was, that not only were persons who had undergone its attack free from its further assaults, but even individuals, and bodies of men, who having come within its pestilential influence had escaped unaffected, were nevertheless much less obnoxious to its further visits than those who had not before been exposed to the virus." The same has been asserted of yellow fever. The evidence is altogether insufficient to show that this supposition has any real basis of fact. Even the question, whether an attack of Cholera gives protection from future attacks of the disease, remains undecided, some Authorities answering it in the affirmative, while others declare that the effect of one attack is rather to predispose to others.

† Notes on Hospitals, p. 7.

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Whatever may be the true explanation, it is to them that a very large proportion of the mortality of the late Epidemic must be directly attributed. This is a fact which cannot be laid down too distinctly, and it must be constantly borne in mind if we hope to escape similar calamities in future. "Hospitals," wrote an eminent French Physician of the last century, "are a curse to civilization." "Hospitals," said Sir John Pringle, "are among the chief causes of mortality in Armies."* It is lamentable to think that these strong assertions should still contain so large a proportion of truth. When we are asked, what, after all, putting aside theories of every kind as to the manner in which Cholera is propagated, was the cause which made this terrible mortality in the hospitals possible, we must answer, with Miss Nightingale, although on somewhat different grounds, a faulty system of management.

Principles of hospital management during Epidemics of Cholera.

415. Although we reserve for a subsequent section of our Report the detail of the practical measures which we recommend with the object of preventing the recurrence in the hospitals of similar circumstances hereafter, it will be convenient, before leaving this part of the subject, that we should distinctly explain the principles upon which our recommendations will be based.

The whole system of treatment in Regimental Hospitals is unsuited to such an emergency as a Cholera Epidemic. Its result is the aggravation of the disease by creating and increasing the very conditions which ought most carefully to be avoided. The principle upon which we urge the necessity of removing men from infected barracks into camp during the prevalence of Cholera is equally applicable to the hospitals. We see as an evident fact that the congregation of men in hospitals is fatal, even when everything has been done that we can suggest for their maintenance in a proper sanitary state. This must be accepted as an almost constant character of the disease, and whether or not we agree upon the manner of accounting for it, we must take the fact as the basis of remedial measures.

The practical object to be aimed at is, that the patients and all persons employed in hospitals during the prevalence of Epidemic Cholera should be separated as much as possible, and never be accumulated in numbers, and that they should be placed under the best sanitary conditions that we can find. The present Regimental system tends to an entirely opposite result; to the concentration and accumulation of men in the hospital.

The Standing Orders of the Army require that the treatment of the sick should be conducted within the walls of a hospital. Whether or not this principle be right in ordinary times, it must be absolutely abandoned during the prevalence of Cholera. During an Epidemic of Cholera, it is essential that everything practicable should be done to prevent the men coming into hospital at all, except on account of serious disease which cannot be otherwise treated.

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* Quoted from Miss Nightingale's Notes on Hospitals, Appendix, p. 93.

416. This is a matter of the highest practical importance on other grounds. We have very frequently noticed in our narrative the excessive dread with which, during the prevalence of Cholera, men look upon the prospect of going into hospital. This dread is founded upon a perfectly true instinct. The men are right in their feeling that in the hospitals they will be especially liable to be attacked by Cholera. The result of this fear on the one hand, and of the frequent objection of Medical Officers on the other hand to the adoption of measures foreign to the ordinary system of hospital management, is that no Medical treatment is afforded during the premonitory stages of the disease when alone Medical treatment has any real value. Thus, a great number of cases pass into the worst stage of Cholera which, if taken in time, might have been cured. It frequently happens that men are brought into hospital in a condition utterly hopeless. They enter the hospital with the conviction that they are going to certain death, and they are placed there under the most unfavourable circumstances for recovery.

We believe, as we shall notice again presently, that the rate of mortality from Cholera in Regimental Hospitals is something quite unheard of under almost any other circumstances.

The treatment of the premonitory symptoms of the disease is therefore necessary for two reasons; 1st, to prevent the necessity of men who are not seriously ill coming into a hospital, where the danger from Cholera will be increased; 2nd, because it is practically found that such symptoms must be treated out of hospital or not at all.

These appear to us to be the principles which must form the basis of future precautionary measures against the recurrence of this excessive mortality in the Regimental Hospitals. The details of the measures which we recommend will be stated further on. High Medical Authorities have frequently insisted upon the importance of the principles which we have now been advocating, but we need not go beyond the history of the late Epidemic for proof of the fact that they have been constantly neglected.

Influence of anxiety and fear upon the liability to Cholera.

417. There is one question intimately connected with those of which we have been speaking, regarding which we have said nothing, because we are in possession of no facts which can throw light upon it. This is the question of how far the liability to the attack of Cholera may be influenced by

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mental anxiety, by fear, and by causes of a kindred nature. Some persons will attribute to causes of this kind a large proportion of the mortality which occurred among the hospital patients, and among men employed in the hospitals in attendance upon their comrades who had been attacked by Cholera.

It is to be regretted that so little is really known upon such questions as this. They have perhaps fallen into undeserved disrepute with the majority of scientific men, a result which probably has been, in some measure, brought about by the excessive prominence which they often assume with persons who are fonder of theory and of sentiment than of fact.

If we say little upon this subject, it is not that we undervalue its importance. Such causes may have produced most powerful effects, and the possibility that this has been the case will be a strong additional reason in favour of the practical measures of precaution which we shall have to recommend.

Influence of fatigue and other causes.

418. With regard to other causes which may affect the liability to the attack of Cholera, we can say nothing useful. Minute inquiries have been made with the object of discovering whether the nature or amount of duty, exposure to heat, damp, or fatigue, or indeed any other discoverable causes had produced appreciable effects. Where any thing of interest bearing upon these points seemed to deserve record, it has been noticed in the narrative in the preceding section of this Report, but few positive opinions can be formed from the scattered facts that have been ascertained. The evidence that has been collected appears to lead to the conclusion that no secondary causes, such as those of which we have been speaking, have any important effect in predisposing to the attack of Cholera.

High proportion of deaths to cases treated.

419. The preceding Tables have shown sufficiently the excessively high proportion which the deaths from Cholera bore to the cases treated during the late Epidemic. There is no room for doubting the accuracy of this conclusion. The more we look into the details given in Table IV, the more evident will the fact appear. The total percentage of deaths to cases among all classes of the European Army is 63·8,—a rate of mortality which, so far as we can discover, has never before been equalled in any Epidemic which has attacked the Troops in India or in any other country.

420. There is, unhappily, great reason for believing that the proportion of deaths from Cholera to cases treated has gone on for many years steadily increasing among the European Troops in all parts of India. This belief is strongly supported by the figures in the following Table* (No. XIX).

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* The figures in this Table are taken from Dr. Ewart's Vital Statistics, Table LVI, p. 150.

TABLE XIX.

Showing the Mortality from Cholera among European Troops in Bengal, Bombay, and Madras, arranged in periods of 5 years.

BENGAL.							BOMBAY.							MADRAS.						
	ABSOLUTE NUMBER.			PERCENTAGE.				ABSOLUTE NUMBER.			PERCENTAGE.				ABSOLUTE NUMBER.			PERCENTAGE.		
Period.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Period.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.	Period.	Strength.	Cases.	Deaths.	Cases to Strength.	Deaths to Strength.	Deaths to Cases.
1818 to 1822 ...	47,017	1,018	272	2·2	0·6	26·7	1818 to 1822-23	31,593	1,284	238	4·1	0·8	18·5							
1823 to 1827 ...	54,168	2,005	625	3·7	1·2	31·2	1823-24 to 1827-28	23,835	885	201	3·7	0·8	22·7							
1828 to 1832 ...	62,800	2,495	544	4·0	0 9	21·8	1828-29 to 1832-33	28,825	510	156	1·8	0·5	30·6	1829 to 1833	54,559	2,312	627	4·2	1·1	27·1
1833 to 1837 ...	57,549	1,561	420	2·7	0·7	26·9	1833-34 to 1837-38	27,575	408	77	1·5	0·3	18·9	1834 to 1838	48,872	521	143	1·1	0·3	27·6
1838 to 1842 ...	68,238	2,406	855	3·5	1·3	35·5	1838-39 to 1842-43	32,709	1,650	616	5·0	1·9	37·3							
1843 to 1846-47..	87,086	2,599	1,177	3·0	1·4	45·2	1843-44 to 1847-48	44,775	1,553	706	3·5	1·6	45·5	1842 to 1846	61,234	1,272	622	2·1	1·0	48·9
1848-49to1853-54*	118,902	2,176	913	1·8	0·8	42·0	1848-49to1853-54*	56,876	491	212	0·9	0·4	43·2	1847 to 1851	48,922	138	86	0·3	0·2	62·3

* Six years.

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421. This Table shows that the percentage of deaths to cases treated has risen, between 1818 and 1854, in Bengal from 26·7 to 42·0; in Bombay during the same period from 18·5 to 43·2; and in Madras, between 1829 and 1851, from 27·1 to 62·3.*

It is probable that these numbers are only approximately correct, especially for the earlier periods; but the general increase in the rates seems to be undeniable. It would be highly interesting to know how far these apparent facts hold good for the Officers of the Army and for other classes of Europeans, but on this point we have been unable to obtain any satisfactory data.

422. The rates of mortality among the Native Troops do not appear to have increased in a similar way. According to Dr. Ewart's Tables, the percentage of deaths to cases treated was 30·4 in Bengal for the 12 years ending with 1838, while for the next twelve years it was 30·8. In Bombay the rate is said to have risen from 30·6 for the 18 years ending with 1836, to 37·9 for a second period of equal length. In Madras, between 1829 and 1838, the rate was 45·1, while between 1842 and 1851 it was 42·1.

To enable us to judge of the exact value of these results, an examination of the details from which the figures are derived would be necessary. The question is one of great importance, and it deserves more complete investigation.

We have shown how far more fatal during the late Epidemic the disease proved among Europeans than among Natives. Among all classes of Europeans the percentage of deaths to cases was 63·8, while among the Native Troops it was 38·2, and among the prisoners in Jails it was 47·9.

423. We have had occasion more than once to notice in our narrative in the first section of this Report, that Medical Officers frequently differ in their definition of the term Cholera. In some Regiments, cases

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* The following figures, taken from Sir J. R. Martin's Work on the Influence of Tropical Climates, are given for the sake of comparison:—

	Cases of Cholera.	Deaths.	Percentage Deaths to Cases.
Troops in United Kingdom, 1832 to 1834...	1,263	365	28·9
Dragoon Guards and Dragoons, United Kingdom, 1830 to 1846	171	54	31·6
Troops at Gibraltar, 1816 to 1846... ...	459	131	28·5

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of serious diarrhœa have been included with cases of Cholera, on the supposition that they were due to the same Epidemic influence. In other Regiments, no cases have been recorded as Cholera except those in which the most unmistakeable symptoms of the disease in its virulent form were present. For this reason the Returns are not always really comparable one with another. There can be little doubt that if it were possible to remove these sources of error, the proportion of deaths to cases would appear even higher than our Tables show it to have been.

424. The data are not sufficient to enable us to form any positive conclusions regarding the causes which rendered the proportion of deaths to cases so excessively high during the late Epidemic, but it is hardly possible to doubt that the accumulation of men in the hospitals had a no less injurious effect in this respect than it had in increasing the number of attacks.

Both in this and in former Epidemics it has been observed that men who were attacked with Cholera in camp had often a far better chance of recovery than men who were attacked in Cantonments, and it appears highly probable that a principal cause for this has been that in the former case they were not treated in the hospital which had become thoroughly infected with the disease. Perhaps the best example of this that occurred during the late Epidemic is that of the Infantry at Morar, where the percentage of deaths to cases treated was 58·4 in cases admitted in camp, 79·6 in cases admitted from the barracks, and 90·9 in cases among the hospital patients.

Medical treatment.

425. It formed no part of our instructions that we should make inquiry regarding the different plans of Medical treatment that had been adopted, nor, considering the manner in which our Commission was constituted, was it possible that the Commission at large should enter into purely Medical questions. We need only say with regard to this part of the subject that almost every Report of every Medical Officer tells the same story of hopeless failure in the attempt to combat the disease in its advanced stages. Almost every remedy, old and new, that has ever seemed to hold out a promise of success, has been tried during the late Epidemic. Not only did every remedy appear useless, but we have found a strong doubt prevailing in the minds of some of the most thoroughly competent of the Medical Officers, whether the practical result of the existing systems of treatment has not sometimes been a positive aggravation of the mortality. A system of supposed curative treatment, which ends in so enormous a proportion of deaths to cases, can indeed, as Dr. Mountjoy

remarks in a passage that we have already quoted, hardly be considered curative at all, unless we can show that Nature, if left to herself, would fail still more completely. "In many instances," writes another very competent Medical Officer, "I imagine that the patient dies of the Doctor rather than of the disease. So long as we know nothing of the nature of the disease, and so long as we have the most opposite modes of treatment, vaunted in their turns as the best, how can it be otherwise?" "If," writes Dr. Elliotson, regarding Cholera in England, "all the patients had been let alone, the mortality would have been much the same as it has been. We are not in the least more advanced than we were when the first case of Cholera occurred."

426. These remarks, however, can be applied only to Medical treatment after the more violent symptoms of the disease have become developed. The belief that in the earliest stage judicious treatment may often be successful in preventing the progress of the disease, appears to have been fully confirmed during the late Epidemic. Many examples of this have been given in our narrative. Among these we may point to the account of the excellent results obtained by Dr. Mountjoy, who was in charge of the Artillery at Morar.

Prevalence of diarrhœa and other diseases.

427. There can apparently be no doubt that in a large proportion of the cases of Cholera that occurred during the late Epidemic, the characteristic symptoms of the disease were preceded by diarrhœa, and during the prevalence of Cholera, diarrhœa was generally very common. The outbreak of Cholera was not, however, often observed to have been preceded by an unusual amount of diarrhœa. At Lahore, Amritsur, Agra, and several other places, Cholera was accompanied or followed by an excessive amount of intermittent fever, but we can say nothing regarding any possible relation that may have existed between them. It must be remembered that seasons of heavy rain, such as that of 1861, are very commonly followed by an unusual prevalence of fever, and the months during which Cholera reached its maximum in Northern India are those in which diarrhœa and dysentery are every year the most common.

Effect of Epidemics of Cholera in raising the rate of mortality.

428. The question has been not unfrequently discussed in Europe, of the extent to which outbreaks of Epidemic disease affect the rate of mortality from other causes. It has sometimes been maintained that when one disease becomes very prevalent, other diseases remain in abeyance. It appears from the Tables published by Dr. Balfour* that in

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* Statistics of Cholera, Madras, 1849.

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years when Cholera has been unusually fatal in India, the mortality from other diseases has also, as a general rule,—subject, however, to much exception,—been above the average. This appears to hold good, both for European and Native Troops, in all the three Presidencies. We have not been able to investigate this question, which is evidently a very complicated one, involving many matters regarding which we have had no means of obtaining information.

429. We give without further comment the following Table (No. XX) to show the mortality from all causes during 1861 for nearly all the Regiments which were attacked by the Cholera Epidemic.†

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† The "average strength" in this Table is only approximately correct, and in some cases the number of "deaths from all other causes" is not quite accurate. The Table is based partly upon our own inquiries, and partly on information received from the Office of the Principal Inspector General of the Medical Department.

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TABLE XX.

Showing the Mortality from Cholera and all other causes in the Regiments mentioned below during the year 1861.

Place at which the Regiment was stationed during the Epidemic.	Regiment.	Average Strength.	Deaths from Cholera during 1861.	Deaths from all other causes during 1861.	Total Deaths during 1861.
Meean Meer ...	51st Regiment ...	905	253	20	273
	94th Regiment Right Wing	475	171	9	180
	5th Bengal Cavalry .	210	31	7	38
	Royal Artillery ...	155	16	3	19
	Bengal Artillery ...	161	14	3	17
Amritsur ...	94th Regiment Left Wing	420	38	10	48
	Bengal Artillery ...	106	3	2	5
Umballa ...	89th Regiment ...	794	45	12	57
	7th Hussars ...	650	7	7	14
	Bengal Artillery ...	235	0	2	2
Delhi ...	82nd Regiment ...	1,080	44	47	91
	Bengal Artillery ...	158	8	3	11
Meerut ...	35th Regiment ...	1,090	26	10	36
	8th Hussars ...	645	29	22	51
	Royal Artillery ...	360	4	5	9
	Bengal Artillery ...	600	27	19	46
Moradabad ...	88th Regiment Left Wing	460	2	11	13
Bareilly ...	3rd Battalion Rifle Brigade	990	5	4	9
	Royal Artillery ...	174	0	5	5
Muttra ...	20th Hussars ...	245	4	5	9
	Bengal Artillery ...	105	0	2	2
Agra ...	42nd Regiment ...	626	39	18	57
	107th Regiment ...	390	25	11	36
	Bengal Artillery ...	112	3	2	5
Morar ...	27th Regiment ...	820	143	43	186
	Bengal Artillery ...	210	8	2	10
Fort Gwalior ...	52nd Regt. (Detachment)...	268	7	3	10
Futtehgurh ...	42nd Regiment ...	255	4	1	5
	Royal Artillery ...	190	1	1	2
Cawnpoor ...	54th Regiment ...	920	24	30	54
	19th Dragoons ...	220	7	1	8
	Bengal Artillery ...	83	1	1	2
Allahabad ...	90th Regiment ...	975	19	30	49
	Royal Artillery ...	185	2	4	6
	Bengal Artillery ...	95	1	1	2
Total ...	......	15,367	1,011	356	1,367

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Proportion of cases fatal in collapse and re-action.

430. The following Table (No. XXI) shows the proportion of cases which proved fatal in collapse and in re-action, and the average duration in hours of cases fatal in collapse. These details have been ascertained for 927 cases. Out of this number, 717 cases proved fatal in collapse, and the average duration of each case was 12 hours. The results for each station are tolerably uniform, and these figures serve to illustrate still further the excessive virulence of the Epidemic.

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TABLE XXI.

Showing the proportion of Cases of Cholera among the European Soldiers during the Epidemic of 1861, *which proved fatal at each Station, in Collapse and in Reaction, and the average duration of Cases fatal in Collapse.*

STATION.	REGIMENT.	Total Deaths.	Died in Collapse.	Died in Re-action.	Percentage Deaths in Collapse to total Deaths.	Average duration in hours of Cases fatal in Collapse.
Meean Meer ...	51st Regiment ...	253	204	49	80·6	11
	94th Regiment ...	171	105	66	61·4	10
	Royal Artillery ...	16	13	3	81·3	16
	Bengal Artillery ...	14	10	4	71·4	17
	Late 5th Bengal Cavalry	31	23	8	74·2	6
	Total ...	485	355	130	73·2	11
Amritsur ...	94th Regiment ...	38	26	12	68·4	13
	Bengal Artillery ...	3	3	...	100·0	7
	Total ...	41	29	12	70·7	12
Umballa ...	89th Regiment ...	45	41	4	91·1	21
	7th Hussars ...	7	5	2	71·5	12
	Total ...	52	46	6	88·5	20
Delhi ...	Bengal Artillery ...	8	7	1	87·5	62
Meerut ...	8th Hussars ...	29	29	...	100·0	11
	Bengal Artillery ...	25	19	6	76·0	15
	Total ...	54	48	6	88·9	12
Moradabad ..	88th Regt. Left Wing	2	1	1	50·0	6
Bareilly ...	3rd Battn. Rifle Brigde.	5	5	...	100·0	8
Agra ...	42nd Regiment ...	39	31	8	79·5	20
	107th Regiment ...	25	20	5	80·0	8
	Bengal Artillery ...	3	3	...	100·0	13
	Total ...	67	54	13	80·6	15
Morar ...	27th Regiment ...	143	122	21	85·3	8
	Bengal Artillery ...	8	3	5	37·5	8
	Total ...	151	125	26	82·8	9
Fort Gwalior ...	52nd Regiment ...	7	5	2	71·5	10
Nuseerabad ...	28th Regiment ...	20	16	4	80·0	18
Futtehgurh ...	42nd Regiment ...	4	4	...	100·0	15
	Royal Artillery ...	1	1	...	100·0	23
	Total ..	5	5	...	100·0	16
Allahabad ...	90th Regiment ...	19	11	8	57·9	12
Do. General Hospital	... ...	11	10	1	90·9	10
	Total ...	30	21	9	70·0	11
	Grand Total ...	927	717	210	77·4	12

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Influence of change of locality.

431. We proceed to speak of a question of the highest possible importance, regarding which it is essential that there should be no doubt or misunderstanding of the facts.

We have already remarked that there is one constant character in Epidemics of Cholera which has been observed in every country in which the disease has shown itself. Although an Epidemic may be diffused over a vast extent of country, the local distribution of the disease is always most partial and unequal. Among a number of places near one another, and apparently placed under altogether similar circumstances, some escape and others are attacked. One part of a town is ravaged by the disease, while other parts are untouched by it. "In a few houses in a street," writes Dr. Baly, "half the inhabitants are carried off by the disease; in the remainder not a single death occurs." Even particular rooms are sometimes fatal to all their inmates, while other rooms close by remain perfectly healthy.

Observation of these characteristics of the disease has often led to the belief that we have here a rational basis for practical measures for mitigating the virulence of an Epidemic of Cholera. If we find that in some particular place there is evidently present a special cause which is fatal to the persons exposed to it, the obviously reasonable plan is, if possible, to avoid the place altogether. Nor is this only a matter of theory. It has constantly been found in practice that the result of removal, even to a very short distance from the infected locality, is sufficient to cause the total cessation of the disease.

Removal of Troops into camp during prevalence of Epidemic Cholera.

432. When Cholera breaks out in a populous city, this is a remedy which it is hardly possible to apply, but with bodies of Troops ready to march where they are ordered at the shortest notice, there is no such difficulty. It may safely be asserted that all the highest Authorities in India and in Europe are agreed in the opinion that this is the most efficacious measure of prevention which it is possible to adopt in case of Epidemic Cholera appearing among the Troops of our Indian stations. Nevertheless, there has seldom been any practical recognition of the fact, and for proof of this assertion we need not go beyond the history of the late Epidemic. The removal of the Troops has almost always been delayed until the measure has been forced upon the Authorities by the increasing mortality which nothing else will check.

Medical Officers whose personal knowledge of the disease has been small are not generally aware how completely it has been proved by past experience that removal from an infected locality is a measure which hardly ever fails to be beneficial.

433. The disinclination to move is very natural. Cholera, in Northern India, usually makes its attacks in the hottest and wettest months of the year. The Medical Officers in charge of our European Troops have seldom seen much of Epidemics of Cholera, and they dread the exposure of the men which removal from Cantonments at such a season necessarily entails. No one who is not thoroughly aware of the absolute necessity of the measure can be expected to do anything but oppose a course which leads to certain discomfort and apparent danger. The opposition is generally not confined to the Medical Officers. The other Officers of a Regiment seldom possess much knowledge upon such subjects, and they naturally object to a measure which seems to them unreasonable. It must be remembered too that in their case the advantage of moving is generally very doubtful. They are exposed to few of the causes of disease which act so powerfully upon the men, and the increased liability to Cholera which they incur by remaining in Cantonments is generally more than counterbalanced by the evils which they must suffer in camp. This disinclination to move has often a powerful auxiliary in the influence of family ties and of friendship. Vague theories regarding the actual cause of Cholera also sometimes interfere with practical measures of precaution. People, for instance, who believe that the progress of Cholera is solely dependent on some general influence that is spread over the whole country,—atmospheric or electric, or any other,—will tell us that slight changes of locality cannot, from the very nature of the case, be useful. This class of objectors, which has not learned that the observation of facts is the sole basis of physical knowledge, is the most difficult of all to deal with.

434. There is a common impression that there is something essentially strange and mysterious in all that concerns this disease, and that it is almost hopeless to attempt to lay down any principles of any kind regarding it. There can be no greater mistake. There is perhaps no disease which has more strongly marked and invariable characteristics, which regularly present themselves during every Epidemic attack, and it is this fact which gives room for hope that means may be found for its prevention. It is only when we come to the purely Medical part of the question that we must admit that we know at present almost nothing. This exaggerated notion of the mysterious character of Cholera often tends to prevent people from taking the most obvious measures of precaution. We find a strong example of this in the manner in which they hesitate to abandon places in which the disease is virulent. There is in reality

nothing more strange in the fact that by change of locality we can generally leave Cholera behind us, than there is in the fact that if we remain in a mine filled with choke-damp we are suffocated, and that if we can leave the mine we leave the danger also, or that if we drink the water of a well into which arsenic has been thrown we are poisoned, while if we go elsewhere for our water we escape. The cases are parallel, except in this, that in the instances which we have given, we can point out the poisonous gas and the poisonous metallic substance, and can understand exactly the manner in which we have suffered or have escaped their noxious influence, while in the case of Cholera the actual poison remains unknown. As a matter of fact, we usually find that by mere change of place we can often leave the Cholera poison as completely behind us as we can leave the choke-damp and the arsenic, but in our ignorance of the actual cause of Cholera, it may happen either that we carry it with us, or that we go into places where the same noxious influence is present. So, if we were equally ignorant regarding the other poisons that we have named, we might go back to be suffocated from other sources of choke-damp, or might carry with us the arsenic to poison our water afresh at every place.

435. We are anxious to make it perfectly plain that the measures which we recommend are based upon facts which cannot be denied, and that in the view which is to be taken of those facts, the highest Authorities have long been of one opinion. It will therefore be desirable that before speaking of the evidence which we have ourselves collected from the history of the late Epidemic to prove the importance of immediately abandoning the localities that have become infected by Cholera, we should show how entirely our conclusions are supported by the experience of the past.

436. Dr. Chevers, in his valuable Work on the Means of preserving the Health of European Soldiers in India, has dwelt strongly upon the importance of this subject. "Where the disease," he writes, "is raging in a barrack, the removal of the men to camp, in an open and healthy position, a mile or two off, usually checks the pestilence as if by a charm. The principle of removing Troops immediately upon the appearance of yellow fever, or other severe Epidemic visitation among them, has long been recognised and acted upon in the West Indies.

"Dr. Kenneth Mackinnon is one of the earliest and strongest advocates of this measure. I need not cite his facts and arguments in its favor, as they are so readily accessible.* I prefer giving other examples, in illustration of the fact, not sufficiently recognised by the service at

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* Indian Annals for October 1856, page 149.

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large; and especially by some young Officers—that, although change of locality may fail in some instances, and then probably from some avoidable defect in the arrangements, it needs scarcely ever, at any season, however trying, be rejected from the fear of putting the men to a still greater risk from exposure, or from the certainty that they cannot be removed beyond the range of the epidemic or endemic influence. On the latter point a strong case occurred in my own experience in the Native Jail of Chittagong in the year 1851. A most destructive Epidemic of Cholera then ravaged the whole of that portion of Eastern Bengal. It chiefly followed the main lines of road along which the villagers perished by thousands. In the Chittagong Jail the disease assumed a very severe, and (in my experience) a very peculiar type. Upwards of thirty deaths occurred,—nearly three-fourths of those attacked,—before the prisoners could be removed to camp. The elevated spot which we selected for the camp was in every way well adapted, except that the main road and an infected village lay at the foot of the hill, and to windward of it. The removal was, however, effected, and not a single case originated in the camp, although one or two men, who probably carried the disease with them from the Jail, were attacked immediately after they got out.

"I may here mention that it has been recommended by Mr. Dempster to change the ground, avoiding the course of the rivers and main roads, and to continue so changing at short intervals until the disease disappears.

"Hot or wet weather, in which such outbreaks are most likely to occur, is certainly no reason for hesitation in removing the Troops. Mr. Dempster has lately brought forward the following striking instance:* On the annexation of Oudh by Lord Dalhousie, Her Majesty's 52nd Regiment was left to garrison Lucknow. A large and lofty range of buildings, known as the 'King's Mews,' was adapted for their reception. The barrack accommodation, thus hastily provided, was much more spacious and convenient than could have been looked for in a Native town; but in carrying out the necessary alterations, a grievous mistake was committed. The floors, and especially those of the verandahs, were much broken and full of deep excavations; and outside there was an enormous dung heap, the accumulation of years, of stable litter of all kinds. The Native Superintendent of the Repairs thought he could most readily execute the order to remove the litter and to repair the floors by filling up the hollows in the floors with dung and litter, smoothing all over with a neat covering of clay and plaster! (The exact principle which has since been adopted in constructing the broad raised trottoirs in Chowringhee Road, the finest thoroughfare in India.) This was not discovered until afterwards. Not long after the Regiment had, on the approach of the hot weather, taken possession of these temporary barracks, Cholera, in a very virulent and fatal form, broke out amongst the men, although that disease was no where else known to exist in the crowded and dirty city of Lucknow. A Special Medical Committee, of which he was President, was assembled to determine what was best to be done under such circumstances. The Committee, considering the disease to have been of local origin, recommended that the Regiment should be immediately moved out into camp to a well drained and open plain, some distance from the city; that an extra number of tents should be furnished for the accommodation of the men; and that the sick being left behind in hospital, all communication should be strictly cut off between the hospital and the standing camp. If, after the first move, Cholera still continued, it was further recommended that the Regiment should again change ground in an opposite direction, and so to keep moving, at short intervals, until the disease entirely disappeared.

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* The Lancet, June 5th, 1858.

"The obvious objections to these measures were, that the hot weather was fairly set in; that such exposure would subject Europeans to the severest forms of tropical disease; and that the remedy might prove a worse evil than the one which it was desired to avoid. To this it was answered that proper precautions being taken, the risk of this exposure was not so great as it appeared to many; and that the Regiment being now under the worst circumstances, it was better to encounter the contingent risk of ordinary tropical disease than to bear the brunt of virulent endemic Cholera. The Committee's recommendations were adopted.

"After going into camp, a decided improvement took place, both in the number and severity of the cases; but the disease was not extinct. A second move was then determined on; the Regiment took up a fine, clear, elevated position not far from the Alumbagh, and in doing so fairly left the Cholera behind. Meanwhile energetic measures were taken to clear and purify the old temporary barracks, and to provide additional accommodation for the men in case disease in any shape should force them to seek better shelter from the sun than that afforded by tents. But the Cholera having disappeared, they happily remained, in other respects, unusually healthy. This being the case, it was determined to leave well alone, and the Regiment continued with perfect safety under canvas during the whole of the remainder of the hot season.

"Another nearly equally striking instance of the value of this measure, judiciously carried out at the most unfavourable season, has recently

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been afforded at Allahabad. On the 19th of April 1859, Cholera appeared simultaneously in two different parts of the station, widely remote from each other,—in the Clydesdale and Chatham Lines, occupied respectively by the 4th European Regiment and by the Convalescent Depôt and General Hospital. The weather (the hot westerly winds ought then to have set in, but easterly winds were most prevalent,) was most sultry and oppressive. The number of Europeans attacked was 236, of whom 109 died. In his interesting Report of this outbreak, Dr. Beatson, Surgeon of the Depôt Hospital, states that—' The decision to place the men under canvas in such stifling weather was not taken without serious anxiety on the part of the Medical Officers, lest the step in carrying them clear of the Scylla of Cholera should lead them into the Charybdis of heat-apoplexy and fever!' Happily, such was not the result. The change, in every case but one, was entirely successful—dissipated Cholera, and re-established the confidence of the men. It is well worthy of note, that the distance to which the Troops were moved lay within a circle whose radius did not exceed a mile and a half; yet it sufficed to rid them entirely of the scourge, and did not interfere with the fixed hospitals in Cantonments, where all the requirements for successfully treating the patients were far more easily attainable than would have been the case in temporary barracks or camp."*

437. We quote the following remarks upon the same subject from Dr. Kenneth Mackinnon, one of the best known and most experienced of Indian Medical Authorities :—

" It is painful to observe that, overlooking the truth how little treatment avails after seizure, the great resource of change of locality is not resorted to, sometimes on account of the consequent discomfort to the Troops, and at other times, as I have known, because sufficient attendance cannot be secured. This does indeed seem very grave infatuation. We know that there is a poison around, almost as deadly as the bite of a snake, and far less amenable to treatment; experience teaches that by change of place we may escape from it.

" What reason then is there in giving consideration to mere discomfort, or to what so seldom affects the issue as attendance and medical treatment ? This is indeed to attach importance in the wrong direction; to weigh in the balance mere trifles in comparison with the weighty consideration that valuable lives are being daily and hourly sacrificed which might and would probably be saved. ' You ask me,' says Dr.

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* Dr. Chevers on the Means of preserving the Health of European Soldiers in India, page 350. We must observe that, for the reasons already explained, we entirely dissent from the opinion expressed in the concluding sentence of the above quotation.

Bruce in his letter to me, so often quoted, 'what I think of removal. Its effects on my Regiment were magical on both occasions that I tried it. In 1848 we had had the disease for four months raging in the Regiment, and it raged equally in the town and bazars. We moved out, I think, on the 1st of September; three or four incipient cases were taken from the barracks; some showed themselves on the road, and the rest within 48 hours of our going out, but we had no case after that. We were out, I think, for 10 days, and were driven in by the rain, and though we found the disease equally bad in the town, on our return, not a single case occurred afterwards in the Regiment. In 1849 we moved out in July; the disease was prevalent in the villages close to us, Colkadeo for one, and Puttealah, I think, was the name of another; on the day we moved out, and for two days after it, men came in with Cholera symptoms, several with cold tongue, purging, &c., but not one fatal case; they were checked by one dose, and after the second day there was not a symptom of the disease among the men. We were out a month on that occasion, and returned, as before, to find the disease still in the town; but, strange to say, not one case occurred in the Regiment from the day we went into camp.' To these instances many might be added, but it is true that the move has not always the desired effect. Under such circumstances I ask, emphatically, what is the wisest course to pursue? to fly to a greater distance yet from the destroyer, or to go back into his jaws? If we go back to a locality where the disease is prevalent, we shall not often be so fortunate as Dr. Bruce was on the two occasions he mentions. The movement should be away from tainted places; consideration of discomforts should not deter us. The courage which can bear the presence for months of a deadly Epidemic is more admirable than that which carries the Soldier up the breach and to the mouth of cannon; but it seems to me that when it is possible, he should be spared the trial."*

438. India is not the only tropical country in which these conclusions have been proved by experience to be sound.

The valuable Report by Dr. Milroy made to the Colonial Office on the Cholera Epidemic in Jamaica in 1850-51 contains many interesting facts bearing upon the same point. "It is in vain," writes Dr. Milroy "attempting to arrest the ravages of the Cholera when it breaks forth with epidemic violence, as long as the people are allowed to remain in their pestiferous abodes. No amount of Medical aid alone will then suffice; you might as well endeavour to extinguish a conflagration with mere pailfuls of water. The only means of preventing a large sacrifice of life is by removing the inhabitants promptly, and locating them for the time in a more wholesome situation. Wherever a judicious removal was effected, the results were most satisfactory. * * In all public Institutions where numbers are congregated together, as in barracks, hospitals, asylums, &c., the first step to be taken on the advent, or rather on the approach, of a pestilence should be to thin and disperse more widely the inmates. This precaution should never be neglected.”

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* Dr. Kenneth Mackinnon on the Epidemics of the Bengal and North-West Presidencies. Indian Annals of Medical Science, October 1856.

439. The letter from the Board of Health in London to the Under Secretary of State, dated 1st March 1853, regarding Dr. Milroy's Report, refers to the same subject in the following terms:—“Much additional evidence has been afforded by the progress of Cholera in this Colony of the truth of one point of the greatest practical importance to individuals, families, and bodies of people, for their direction and guidance, * * *viz.*, that security during the prevalence of an Epidemic is to be found, not in isolation or prohibition of intercourse with the sick, but in early removal from the infected locality. Universal experience has shown that in the most extensive outbreaks of Epidemics, there are spots often near the localities in which the disease is raging with the greatest virulence, which may be occupied in perfect safety.” Several interesting examples are given by the Board of the satisfactory results of removal from places infected with the disease. We quote one of these only :—

“The health of the 3rd West India Regiment at Up-Park camp (Jamaica) continued to be tolerably good until the 5th June. During May, indeed, there had been many cases of diarrhœa, but they readily yielded to treatment. On the 5th of June, two men were attacked with malignant Cholera and both died. Other cases rapidly followed, and continued to occur until the 21st of the month, when the barracks were white-washed and fumigated. Dr. Summers, the Surgeon of the Regiment, recommended that the Troops should be moved from the barracks, and put under canvas; but his advice was not then followed. There was a lull for a week, and then again the disease broke out on the 28th with alarming severity. The men were now immediately camped out in tents on the parade ground to the south of the barracks, and with the happy result of at once arresting the pestilence. ‘No sooner’, says Deputy Inspector Dr. Maclean, ‘were the Troops removed from the barracks, where the scourge was prevailing with excessive malignity, and placed under canvas, than the disease immediately disappeared from the Cantonment.’ Not a single case was admitted from the encampment, with the exception of one in a man who had been released only

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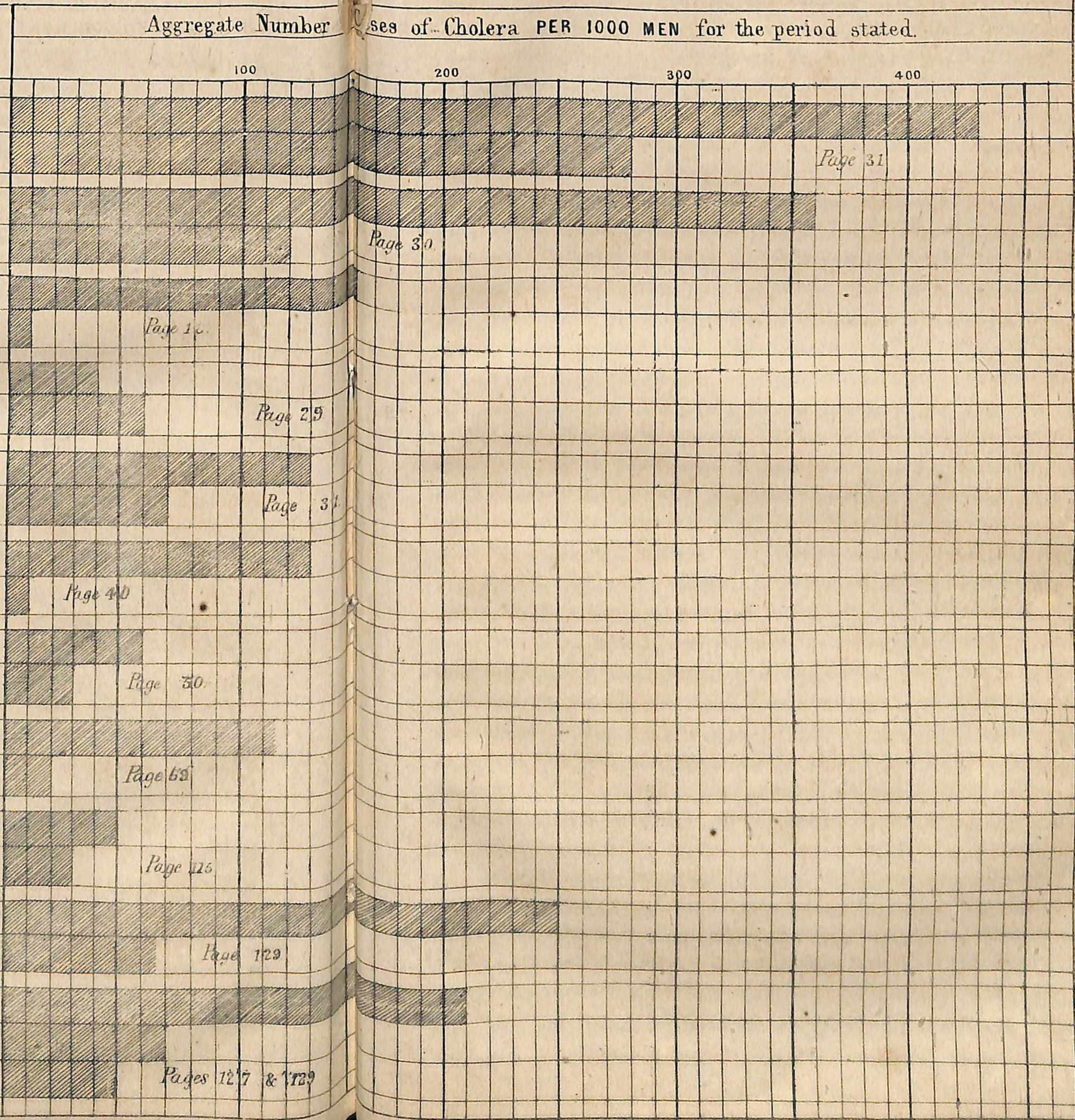
To illustrate the results the removal of Troops from

CANTONME S INTO CAMP

during the preval of Cholera in 1861.

Station	Corps.	Period	Average Strength	Locality.
MEEAN MEER.	51st Regt	Augt 17-27	360	Cantonment 11 days.
		Do	359	Camp Chubeel 11 days
	94th Regt	Augt 28 Septr 15	115	Cantonment 19 days
		Do	202	Camp Neaz Beg 19 days
	Bengal Horse Artilly	Augt 8-16	89	Cantonment 9 days.
		Augt 17-25	82	Camp Shahdera 9 days.
	Royal Horse Artilly	Augt 13-22	180	Cantonment 10 days.
		Augt 23 to Septr 1	175	Camp 10 days.
	5th Bengal Cavalry	Augt 16-25	211	Cantonment 10 days.
		Augt 26 to Septr 4	192	Camp 10 days.
AMRITSUR	94th Regt	Septr 7-12	207	Cantonment 6 days
		Do	192	Camp 6 days
UMBALLA	89th Regt	Augt 8 to Septr 4	195	Cantonment 28 days.
		Do	592	Camp 28 days.
DELHI.	82nd Regt	July 22-27	157	Palace 6 days.
		Do	292	Camp 6 days.
AGRA.	42nd Regt	July 17-26	572	Cantonment 10 days
		July 27 to Augt 5	478	Camp 10 days.
MORAR.		Augt 1-21st	348	Cantonment 21 days
		Do	175	Camp Phool-Bagh 21 days.
	27th Regt	Augt 7-21		Cantonment 15 days.
		Do		Camp Girgaon & Oodepore 15 days.
		Do		Camp Phool-Bagh 15 days.



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the day before from the Penitentiary, where there was a good deal of Choleraic disease at the time."

Similar quotations might easily be multiplied, but we have said enough to show that in Europe as well as in tropical countries, the best Authorities have come to the same conclusion.

440. Although the records of former Epidemics of Cholera show very plainly the general advantage that has followed from the abandonment of the places in which the disease had become virulent, they are often wanting in precision. The late Epidemic has afforded, in this respect, valuable examples, which enable us to show distinctly the results that have followed from such changes.

The accompanying sheet of Diagrams has been prepared to illustrate the facts that we have ascertained. The details of each case have been given in the narrative in the first Section of this Report. These Diagrams place the matter in a very clear and easily intelligible form, and they exhibit the actual results of each movement more plainly than could be done by any figures or descriptions.

When a portion only of a Regiment was removed into camp, and the rest of the men remained in the Cantonments, we have the means of making an actual comparison between the virulence of the disease in both places, for the same period of time, among bodies of men who had been placed under precisely similar conditions before the movement was carried out. These comparisons are far more satisfactory than any others that can be made, but they are not always possible, because it often happens that the whole Regiment leaves the Cantonments at the same time. In the latter case we must either compare the virulence of the disease in camp with that which it shows among other bodies of men in the Cantonments, or, assuming that the disease would have continued at a uniform rate if no change had been carried out, we must compare its virulence after going into camp with that which it had shown during an equal length of time before leaving the Cantonments. The accompanying Diagrams represent the results of removing Troops into camp according to both these plans of calculation, the first being chosen whenever it was possible.

441. No evidence can well be more conclusive than that which we have here given, and the more we look into the details, the more certain do the results appear. These Diagrams, indeed, strongly as they represent the immense advantage that followed the removal of the Troops into camp, often do not show the whole truth. Thus, for example, in the second Diagram which represents the results of the march of the 94th Regiment from Meean Meer, although the advantage of the change is

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very strikingly exhibited, a reference to our narrative will show that the actual results were far more remarkable than those which we have represented in the Diagram. For the first four days after the movement was made, that is, from the 28th August to the 1st September, Cholera continued in the camp; but it then ceased altogether. In the Cantonments, not only was the disease far more virulent during these four days, but it continued to prevail until the 15th September, a fortnight after it left the camp altogether.

So, too, at Amritsur, in Her Majesty's 94th Regiment, the mortality represented in the Diagram as having occurred in camp took place on the first day that the camp was formed; the disease then entirely disappeared, although it continued in the Cantonments for 19 days longer.

The only one of these Diagrams which shows a greater mortality in camp than in Cantonments is that representing the results of the removal of the Royal Horse Artillery into camp from Meean Meer. But even in this case, when we look into the facts, it can hardly be doubted that the change was in reality beneficial, for, although the number of cases of Cholera increased upon going into camp, the disease disappeared altogether in four days, while among the Troops who remained behind in the Cantonments, it continued for more than a fortnight longer. There is no reason for supposing that if the Royal Artillery had not left Meean Meer, they would have been free from Cholera any sooner than the other men who remained there.

Thus, also, in the case of the detachment of the 51st Regiment, which left the Fort of Lahore on the 27th August, although it is true that the men suffered very severely, it must be remembered that the disease entirely ceased five days after they went into camp.*

442. It is plainly, as we have before remarked, unreasonable to expect that the instant result of a change of locality must be the total cessation of the disease. When Cholera has been prevailing in any place for a considerable time, it may always be looked upon as probable that some men who have already the seeds of the disease in them will be attacked after the movement has been carried out. Not only is it irrational to assume that because Cholera continues under such circumstances, the change has been useless, but it ought to be considered that, until four or five days have elapsed, there are no means of forming a just conclusion as to the actual results that have been obtained.

It must also be observed that in some of the most successful cases, the first result of the movement has apparently been a momentary

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* In consequence of the numerous discrepancies in the Returns for this detachment the results of its removal into camp cannot be represented in a Diagram.

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increase in the number of attacks. The fatigue of the march and the exposure may probably have had the effect of causing the disease to become fully developed sooner than would otherwise have happened.

443. Examples may doubtless be given of instances in which the removal of Troops from places in which Cholera was prevalent has failed to remove the disease, or even to check its virulence. The more, however, that we have inquired into the matter, the more evident has it become to us that the cases in which the measure had a fair trial, but was nevertheless unsuccessful, have been rare. In most of the instances in which little benefit seems to have resulted, it is clear either that the removal was carried out too late, or that there was such evident mismanagement that to expect advantage would have been unreasonable.

444. Two cases which occurred during the Epidemic of 1856 have been particularly noticed, in which the removal of men into camp during the prevalence of Cholera was apparently attended with unfavourable results. Considerable stress has been laid upon these cases by some Medical Officers, and we have thought it desirable to inquire into the actual facts that occurred.

They give good examples of the hasty conclusions which have not unfrequently been formed regarding this very important subject.

445. We quote from Dr. Chevers the following statement* :—

"On the 10th of June 1856, Cholera made its appearance, in a malignant form, among the men of the 3rd Bengal European Regiment at Agra. Mr. Crozier, the Surgeon of this Corps, who has given an able report of the outbreak, mentions that in May and June the heat was most intense, and the Thermometer in his hospital rose to 98°, notwithstanding the use of tatties and thermantidotes; and it was reported that many Natives had died from apoplexy and coup de soleil. May, especially, was an unusually oppressive month,—then, as lately at Allahabad, 'very unseasonable, and marked by the absence of the usual hot westerly winds, easterly breezes being very prevalent.' Late in July, a Committee of Medical Officers recommended that the Corps should be moved into camp. An elevated spot at Rambagh, five miles from Cantonments, across the river, was selected for the encampment, and early on the morning of the 26th they marched out, leaving their sick, with the women and children, in Cantonments.

"Mr. Crozier accompanied the column, and could not help observing the weakly and exhausted state of the men, especially the young lads, who were unacclimatized, and who had previously suffered from ill health during a residence of two years at Chinsurah. They arrived at their ground long before sunrise; tents were soon pitched, and the necessary arrangements for the comfort of the men were early accomplished. The numerous doolies were soon on the ground, with the men who had fallen out on the way from fatigue. Hospital tents were quickly pitched, and preparations made for accommodating patients. Mr. Crozier adds that this movement was attended with most disastrous consequences. The heat in tents was unbearable; and at noon of the same day, the admissions of Cholera, apoplexy, and fevers were so numerous that it was with difficulty accommodation could be found for them. Sickness continued on the 27th and 28th, and on the 29th, on the Surgeon's strong recommendation, they were allowed to return into barracks.

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* On the Means of preserving the Health of European Soldiers in India, p. 353.

"In June the admissions were 128, and the deaths 56. In July 61 were admitted, of whom 27 died. Making a total of 83 deaths of fighting men out of a strength of 887."

446. Although we have not been able to obtain full details of everything that occurred, it appears clear that this case affords, in point of fact, no evidence whatever against the expediency of moving into camp on the outbreak of Epidemic Cholera.

The disease had been raging in the Regiment for sixteen days when it was determined to move. On the 26th June, at 3 A. M., the men marched to the Rambagh. On the 28th June, as there was no diminution of sickness, orders were given for their return to barracks, and the Regiment came back early on the following morning. Thus the men were absent from the Cantonments three days. Because a body of men among whom Cholera had been virulent for so long a period did not get rid of the disease immediately after their departure from the Cantonments, it was plainly unreasonable to assume that the change had been of no service. The time for determining this point had not arrived when the men were ordered back to their barracks. There was no better reason, it seems to us, for bringing this Regiment back into Cantonments, than might have been assigned, during the late Epidemic, in the case of the detachment of the 94th Regiment at Meean Meer, on the first or second day after it had marched to Neaz Beg. We find it stated in a Report of the Superintending Surgeon, written on the 2nd July, four days after the men had re-occupied the barracks, that "the return of the Regiment to their barracks has in no way diminished the sickness." Not only did Cholera prevail with unabated virulence after the return to Cantonments, but cases of apoplexy and fever still continued to occur.

The 3rd European Regiment was sent to the Rambagh, because the results of removal to that place had, on the occasion of a former

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Epidemic, been very satisfactory. In 1843 Her Majesty's 39th Regiment at Agra was suffering severely from Cholera. It was sent into camp to the Rambagh. "In about a week the experiment was attended with complete success, and the disease disappeared."*

447. A very similar case to that which we have just noticed occurred at Meean Meer during the Cholera Epidemic of 1856.

The 2nd and 3rd Troops, 2nd Brigade Horse Artillery, 210 strong, were virulently attacked by Cholera on the 7th August. On the 12th August, after 33 cases of Cholera had occurred, they were sent into camp at Umur Siddhoo. Almost immediate benefit followed, and on the 15th August the 4th Battalion of Artillery, 324 strong, which was also suffering severely, was ordered to march to the same ground. On the 16th and 17th there were numerous cases in the Battalion, and on the 18th, as it was considered that change had been useless, the men were brought back to the Cantonments. On the 19th the Horse Artillery returned also, although during the previous 48 hours there had been no fresh cases among them. On their return to Cantonments the disease re-appeared, and 28 more cases occurred before the Epidemic ceased. Cholera continued to be virulent in the Battalion also after the return to Meean Meer.

In this case the Horse Artillery suffered severely during the first four days that they were in camp, but Cholera then disappeared altogether until the men were most unwisely brought back into barracks. The disease might probably have ceased in the Battalion also if the results of the movement into camp had not so hastily been determined to be unfavourable.

This case has been quoted as evidence against the propriety of abandoning barracks during an Epidemic, but it evidently shows nothing of the kind. So far as it is possible to draw any conclusions from the facts, they evidently tell in favour of moving, not against it.

448. We do not pretend to explain every case of failure, nor to deny that many such may have occurred.† But we are convinced that under all circumstances which it is possible for us to foresee, the removal of Troops who have been attacked by Cholera is a measure which ought always to be adopted during Epidemic outbreaks of the disease. Whatever

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* Report of Superintending Surgeon to Medical Board, dated 2nd July 1856.

† Remarkable cases have been recorded in which Regiments have been attacked upon a march, and in which Cholera has travelled with them from place to place through a long journey. This appears to have frequently happened among the Native troops in Madras, but in the Bengal Presidency such cases have been comparatively rare. No instances have come under our own observation, and we have not been able to investigate the circumstances which attended former cases of the kind.

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be the state of the weather, however extreme the heat or excessive the rain, or whatever be the danger from other diseases, no choice should be permitted. Under circumstances as unfavourable as any that can be imagined, the measure has almost always proved successful; the danger from delay will always be greater than the danger from exposure; and experience has proved most conclusively that this is not a matter which can properly be left, or need be left, to be decided when the occasion occurs.*

The details of the practical measures which we recommend will be given in the final Section of this Report.

General results of enquiry.

449. We have now completed our account of the Cholera Epidemic of 1861. Although our enquiry has brought to light much that is very lamentable, its general results are so far satisfactory that they give us hope for the future. Whenever an excessive mortality occurred among the Soldiers, it was obviously due to causes which might have been avoided,—either to positive mismanagement, or to the neglect of precautions which it was easy to adopt. Even in stations where the disease was less fatal, and where, so far as depended on the exertions of individuals, the management of affairs was excellent, we can generally recognize the causes which evidently increased the virulence of the disease. The uniform character of the facts which have been observed during this and during previous Epidemics is very striking. If we can provide against the needless aggravation of the disease by mismanagement, we may find in this uniformity of character a perfectly sound basis for measures of precaution and of remedy.

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* The General Order issued by His Excellency the Commander-in-Chief, dated Simla, 7th April 1862, is based upon the principles which we have now been advocating.

SECTION III.

*Special measures for the prevention of Cholera among the European Troops.**

450. We proceed to state the nature of the measures which we believe are the most likely to prove beneficial in future, and which we recommend the Government to carry out.

Importance of general sanitary measures.

The plans which may be adopted for the prevention of Cholera are of two kinds. It has been proved by experience that this, like many other diseases, is in a great degree dependent upon local sanitary conditions for its diffusion. Everything which tends to the improvement of the public health may be expected to have its effect in diminishing the mortality from Cholera. The necessity of measures of this kind cannot be too strongly insisted on. Without wholesome and well ventilated dwellings, good conservancy and drainage, and attention generally to matters of sanitary importance, we must not expect to be able to contend successfully with Cholera. The preceding narrative will have shown how much remains to be done in these respects to render the condition of our Indian Cantonments satisfactory.

General sanitary measures not alone sufficient.

451. Measures, however, which are undertaken for the attainment of these objects are not applicable to Cholera alone, nor can it be expected that they can by themselves be sufficient, unless carried out with a completeness far greater than any which we are likely to see. We shall now confine our attention to measures which have a special applicability to Cholera at the present time and under present circumstances. It may be true that, with perfect sanitary arrangements, we should require few special measures of precaution against Cholera, but we are still far distant from any perfection of the kind. The difficulties of the practical question with which we have to deal, must not be evaded in the advocacy of general principles, the importance of which cannot be denied, but which at the present time cannot give us the remedy that we require, and of which the

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* Some modifications of the Rules contained in this Section have been proposed by the Sanitary Commission for Bengal, and have been sanctioned by the Government of India. These are now shown as foot-notes, and are distinguished from the original text by inverted commas.

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observance would be almost equally necessary if no such disease as Cholera existed.

Observation of facts the sole rational basis for measures of precaution.

452. Practical measures for the prevention of Cholera can only be founded on the observation and recognition of the facts which the disease ordinarily presents. If this principle be kept constantly in view, and mere theory be carefully avoided, we believe that very much may be accomplished. We do not overstate our opinion when we say that measures may be adopted which will render such mortality among our Soldiers as that which occurred during the late Epidemic at Meean Meer and Gwalior hardly possible for the future.

In the preceding Sections of our Report we have stated all the more important facts which are generally characteristic of Epidemics of Cholera in Northern India, and the conclusions which they appear to authorize. We shall now assume that those facts are correct, and that, without further explanation or argument, we may take them as the basis of our proceedings. We shall recommend nothing which cannot easily be carried into effect, or which does not appear to us essential. If measures of precaution are to be really useful, they must be easy of accomplishment. It is useless to lay down schemes which may be theoretically perfect, but which will break down in practice.

It must be remembered that the measures which we recommend in this Section are only intended to be strictly applicable to places in the North-Western Provinces, Oudh, the Punjab, and any of the adjoining Native States in which European Troops may be stationed.*

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* "We recommend that, with the modifications which have now been proposed, the Rules laid down by the Cholera Commission be declared binding upon all Civil, Military, and Medical Authorities at stations for European troops in the North-Western Provinces, Oudh, the Punjab, and in the Central Provinces. The only Stations to which the rules may possibly not always be applicable are those situated in the Hills: with respect to them, the rule proposed in the following paragraph for Stations in Bengal should, we think, be declared to be in force.

"The rules which refer to the removal of troops into Camp, and to the abandonment of buildings which have been attacked by Cholera, were drawn up by the Cholera Commission with special reference to Northern India, and it is possible that they may require some modification in Bengal. We recommend that orders be issued to the effect that the principles laid down by the Cholera Commission with respect to these subjects should be carefully attended to by all the Authorities in Bengal, and that the rules should be acted upon so far as, in the opinion of the principal Medical Officer on the spot, may be practicable. All the other rules which do not refer to the removal of troops into Camp or to the abandonment of buildings, should, we think, be declared to be in force in Bengal.

"The principles laid down by the Commission will be equally applicable to the case of Jails and other public establishments, although the particular rules prescribed will, of course, often be unsuitable."

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Precautions necessary in anticipation of appearance of Cholera.

453. We must start with the conviction that Cholera is an enemy whose attacks are always impending. The outbreak of the disease is often so sudden and so violent that this is essential to success. Every preparation must be made in anticipation of a danger which will infallibly come at one time or other. We have had frequent occasion to notice the fact that while Cholera was raging at places not very distant, nothing authentic was known at many stations of the progress of the disease. Such ignorance is very mischievous. Opportunities are lost for adopting precautionary measures, and people are either left in a false security, or needlessly alarmed by exaggerated reports. Outbreaks of Cholera are seldom altogether simultaneous at different places, and it is of the utmost importance that every station should receive notice of the possible approach of danger.

Military Authorities to send to other stations intelligence regarding outbreak and progress of Cholera.

454. Whenever Cholera shows itself in an apparently epidemic form at a station or in a District in which European Troops are quartered, notice of the fact ought instantly to be sent by telegraph to the Head Quarters of the neighbouring Divisions of the Army. The Commanding Officer should be held responsible for the strict observance of this standing order. He should also send information from time to time of the progress or cessation of the disease, noticing any facts the knowledge of which may appear likely to be useful at other stations. These Reports may be always made in a few words, and they need give little trouble. All information received by the Military Authorities should be immediately communicated by them to the chief Civil Authority of the District. He again should transmit the information to the Officers subordinate to him.

Civil Authorities responsible for giving information of outbreak of Cholera to Military Authorities.

455. The Civil Authorities of every Division and District must be held responsible for obtaining immediate notice of the outbreak of Cholera in their jurisdictions, and for communicating it to the Military Authorities without the least delay. It is perfectly possible at the present time that Cholera may be raging among the Native population within a few miles of a Cantonment of European Troops, and that the fact may be altogether unknown to the Military Authorities. We believe that orders were issued by the Government a few years ago on this point, but little attention has been paid to them.

Advantages of such knowledge.

456. The transmission of information regarding Cholera need cause no alarm. The Reports may, if it be thought necessary, be considered confidential, but we

believe that this will seldom or never be desirable. The knowledge that the attack of the disease is considered possible will be far more likely to produce beneficial than mischievous results, and the belief that the Authorities are alive to the danger, and are prepared to meet it, will tend to allay rather than to increase unnecessary alarm.

Sanitary precautions.

457. When an outbreak of Cholera appears probable, the Authorities must be prepared for immediate action. Every ordinary sanitary precaution must be attended to with increased vigilance; but if proper care be taken at other times, there ought to be comparatively little to do. Want of attention to the conservancy and to the general sanitary condition of a station is inexcusable at all times. It often happens that more harm than good is done by the attempts at improvement made when Cholera has actually appeared. This is not the proper time for emptying offensive drains and cess-pools, and for stirring up possible sources of disease. The utmost care should be taken to prevent over-crowding in the barracks and hospitals. If no buildings to afford additional room can be found, it is better to move some of the men into tents than to permit the least approach to over-crowding at such a time.

Precautionary measures in barracks.

458. When the attack of Cholera is thus looked forward to, measures must be taken for paying the most vigilant attention to the health of the men in barracks, and for treating there* all slight cases of diarrhœa or other disease, which, if neglected, might pass into Cholera. The reasons which show this to be a matter of essential importance have been explained in the preceding Section of this Report.† Regarding the manner in which measures for this purpose should be carried out, it will be more convenient that we should speak further on when we consider the system which ought to be adopted in the hospitals during the prevalence of Cholera.

Communication with infected localities to be prevented.

459. If Cholera appears among the Native population in the neighbourhood, communication with the infected locality should, as far as possible, be prevented. The same principle should be acted upon on all occasions during the prevalence of the disease. This is desirable, whether or not Cholera be looked on as contagious or communicable. Frequent communication with places where the disease is prevalent will always be likely to cause alarm, and to produce bad results. We do not mean to recommend attempts to establish a system of quarantine, or to draw a *cordon sanitaire*

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* " After the words 'treating there,' add—'or in Observation Wards entirely separate " 'from the Hospital.' "

† Vide Sec. II, paras 401 to 416.

round a cantonment or a camp. We desire only to prevent communication which is not essential, and which may possibly be mischievous.

Choice of encamping-grounds.

460. One other important precautionary measure must be carried out, in anticipation of the necessity of placing the Troops under canvas, should their removal from Cantonments be required.

Suitable places must be selected beforehand at every station for encampments. During the late Epidemic, it happened almost everywhere that there was no sufficient information regarding the character of the encamping-grounds that might be made available, or the routes by which they could be reached. The movement of Troops during the rainy season is unusual, and this was doubtless one main reason for the absence of the knowledge which was so urgently required.

Points to be attended to in choosing encamping-grounds.

461. The existing encamping-grounds, which are ordinarily used by Troops on the march, are very commonly situated upon great lines of communication, and will therefore be objectionable. Whether or not we believe that Cholera is communicable by human intercourse, bodies of men supposed to be infected with the disease ought always to be isolated as much as possible. We do not, however, propose absolutely to interdict the use of such encampments. It will sometimes happen that they are the only ones that can be made available, either because no other places in themselves suitable can be found, or because, during the rainy season, they are the only ones easily accessible. But whenever it is possible, ground not in the vicinity of great thoroughfares should be preferred.

We need say little regarding the other points of sanitary importance to be attended to in the choice of ground. So much must depend on local circumstances, that it is best to leave as wide a latitude as possible to the Officers on the spot, who will have to make the actual selection. Inquiry should be made into the previous character of the neighbourhood with regard to liability to Cholera, or exemption from it. The ground should, of course, when possible, be high, with natural facilities for drainage, and with a supply of good water. Although rank vegetation is objectionable, the presence of large trees should be considered advantageous, both because they add to the salubrity of the air, and because their shade will be valuable.

Number of encamping-grounds required.

462. The number of encamping-grounds to be chosen at each station must depend upon the number of Troops quartered there. Provision should be made for the possible encampment at one time of the whole European Force, although we do not anticipate that this will often be necessary.

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It will be desirable to reduce the number of men in each camp as much as possible, and occasional change of ground may be required. It will therefore be right to select as many places as, under the circumstances, may be practicable.

Distance of encamping-grounds from Cantonments.

463. Four or five miles from the Cantonment is perhaps generally the most desirable distance for encampments; but this must depend upon local circumstances. The ground must be easily accessible to wheeled carriage at all seasons of the year, and it is desirable that communication between the camps should be possible without passing through the station. Removal to a greater distance than we have recommended is not likely to be more beneficial. The difficulties of transport will be increased, and the Commanding Officer and the chief Medical Authority will be unable to exercise a constant control and supervision.

No permanent charge anticipated.

464. In the vicinity of almost every station, ground sufficiently good for the purpose can easily be found, and as its occupation will seldom be necessary, we anticipate no permanent charge on this account. If at any station no suitable places are really available, ground must be obtained, and compensation must be paid to the proprietors; but we believe that the cases will be extremely rare, if indeed they occur at all, in which this will be necessary. In the first instance some expenditure may occasionally be requisite in clearing the ground, in improving its drainage, or in making it easy of access, but if the ground be judiciously chosen, the charge to Government need be very little.

To determine suitability of ground for encampment, observation in the rainy season necessary.

465. The best situations for these encamping-grounds cannot, in many instances, be determined except during the rainy season. It will be at this time of the year that they will be most likely to be required; they must be chosen with special reference to this fact, and it will not always be possible to ascertain satisfactorily, without actual observation during the rains, whether or not a place is really suitable.

Approaches to encamping-grounds to be kept in order.

466. The approaches to the encamping-grounds that may be selected must always be kept in sufficiently good condition. The expense of this need be very trifling.

Buildings suitable for temporary occupation of Troops.

467. Generally speaking, in Northern India, removal from Cantonments will signify removal into tents, and experience seems to show that this is, upon the whole, more likely to be beneficial than removal into other buildings. When, however, in the vicinity of any station, buildings suitable for

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refuges exist, they should not be neglected. The open arcades and halls of old Native buildings afford sometimes excellent quarters. We do not recommend that the Government should incur any large expenditure for improving them, but when at a small charge they can be put into sufficiently good order for the temporary occupation of Troops, this should be done.

Record to be made of situation, &c., of each encamping-ground.

468. The situation of each encamping-ground or building, and the approaches to it, must be laid down in a Map, and the extent of the accommodation at each place must be carefully recorded, so that the necessary information shall always be available when it is wanted.

Details to be left to the local Governments.

469. On this part of the subject we need say no more. We recommend that the local Governments be requested to carry out the plan that has been suggested in the manner which, with reference to the circumstances of each place, they may consider most desirable.

Employment of Railways for moving Troops during Epidemics.

470. It has been suggested by Dr. Murray* that the extension of Railways in India may add greatly to our means of contending with Cholera by increasing the power of moving men rapidly to a great distance from the place where an Epidemic prevails. Among the possible measures that may be useful in emergencies when everything else has failed, this ought not to be forgotten. It appears to us, however, to be probable that the removal of Troops, in the manner which we recommend, to places at short distances from the Cantonments, will usually be found quite as beneficial as to places much further off. The reasons for this belief have been fully explained in the preceding Sections of this Report. The Railways may, however, sometimes be extremely valuable in enabling men to be moved without danger from one healthy station to another, through an intervening tract of country infected with Cholera.

Supply of camp equipage.

471. Although, if the measures we recommend are carried out, the encampment of the whole of the European Force at any station will perhaps not often be necessary at one time, we must nevertheless anticipate this possibility. The ordinary supply of camp equipage will not always be sufficient for these emergencies. The number of tents allowed for each Regiment is calculated at the rate of sixteen men per tent, but when beds are put into them, not more than eight men can be accommodated in each.

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* Vide his Report on Epidemic Cholera in Agra, &c., during 1861.

Even if no beds were taken, this number ought hardly to be exceeded. We recommend that the proper Authorities be required to report upon the best and most economical way of providing the additional camp equipage required for each station. We believe that the number of tents in store is very large, and it appears probable that a scheme may be devised, which, by differently distributing the existing stock, shall entail little additional expense. The extension of Railways will lessen the necessity of keeping at every station a large supply of additional tents.

Carriage.

472. With regard to carriage, we anticipate no difficulties which need be provided for by any expenditure beforehand. It will hardly ever happen that the whole of the Troops at a large station will have to move out of Cantonments on the same day, under the rules which we propose; and if any emergency should occur, we believe that there will be no difficulty in meeting it. In almost every case there will be ample warning to enable arrangements to be made in anticipation of the necessity of moving. The Civil Authorities should be desired to give every assistance in their power in all matters connected with the march of Troops under these circumstances.

Abandonment of buildings in which Cholera has appeared, and arrangements for accommodation of the inmates.

473.* If, notwithstanding all precautions, a case of Cholera occur in any building occupied by European Troops, the room or portion of the building in which it occurred must be immediately vacated, and, except for the purpose of purifying it, no one should be allowed to enter it. If the whole building can be left, it

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* "*Paras.* 473 *to* 475.—Taking into consideration the present state of Barrack accommodation, we think that these three paragraphs may advantageously be modified as follows:—

"473 A. If, notwithstanding all precautions, a case of Cholera occur in any building occupied by European troops, the room, or portion of the room or building in which it occurred, should, if possible, be immediately vacated, and, except for the purpose of purifying it, no one should be allowed to enter it; if the whole building can be left, it will be still better. This is not laid down as an absolute rule, because sporadic cases of Cholera sometimes occur when there is no reason for anticipating an epidemic outbreak, and under circumstances when the observance of such a rule might cause great inconvenience and probable evil. If, in the opinion of the principal Medical Officer on the spot, there is no reason for supposing either that Cholera in an epidemic form has appeared among the troops, or that an epidemic outbreak is to be anticipated, it will be left to him to determine how far the abandonment of any room or building is necessary. When men are removed from a building supposed to be infected, the best arrangements which under the circumstances are possible, must be made for their accommodation. This is a matter which ought to have been considered before the appearance of the disease. and the authorities must be prepared beforehand in this as in all other respects. The men must not be distributed among

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will be still better, but it is not necessary to lay this down as an invariable rule, for this might sometimes cause great inconvenience, and worse evils than those which we desire to avoid. The best arrangements which, under the circumstances, are possible, must be made for the accommodation of the men who have been removed from the infected building. This is a matter which ought to have been considered before the appearance of the disease, and the Authorities must be prepared beforehand with their measures in this as in all other respects. The men must not be distributed among the other Troops. So far as may be possible, they must be separated from the men among whom the disease has not shown itself. If no buildings which are entirely separate can be made available, they must go into tents. It must be insisted on that their removal shall lead to no over-crowding either of themselves or of other men.

Purification of vacated buildings.

474.* When a building or room has thus been vacated on account of the appearance of Cholera, it must be at once thoroughly purified. The walls should be white-washed, the wood-work painted, the floors and all furniture cleaned. The latrines, urinaries, and wash-houses which were used by the man attacked by Cholera and by the other inmates must be closed when the room or building is vacated, and their use must not be permitted until they have been completely purified. The work of cleansing these buildings must be carried out without the least delay, in the most careful manner that can be devised. Chloride of lime, or Condy's Fluid, or other disinfectant, should be freely used. All filth and rubbish from the latrines must be buried at a distance, and all vessels used for their removal must be carefully cleaned at the place where the refuse is deposited.

Re-occupation of vacated buildings.

475.* If no more cases occur among the men who were in occupation of the building in which Cholera appeared, they may return to it after ten days have elapsed, provided that all the measures of purification have been carried out.

"the other troops. So far as may be possible, they must be separated from the men among "whom the disease has not shown itself. If no buildings which are entirely separate can be "made available, it may be desirable that they should go into tents. It must be insisted on "that their removal shall lead to no over-crowding either of themselves or of other men. "If the principal Medical Officer on the spot should consider that Cholera in an epidemic "form has appeared among the troops, or that an epidemic outbreak is to be apprehended, "the room or portion of the building in which the disease has shown itself must be immediately vacated, and the rules contained in paragraph 477 and in the succeeding paragraphs "will be applicable. In determining whether or not the disease has assumed an epidemic "form, the rule contained in the concluding sentence of paragraph 479 will be observed.

"474 A. When any case of Cholera occurs, even though it should be considered to be "sporadic only, the room in which the disease has shown itself must at once be purified in

* See note in preceding page.

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Arbitrary rules essential.

476. It is doubtless perfectly true that sporadic cases of Cholera often occur, which are not the forerunners of epidemic outbreaks, and that the omission of the precautions which we now advise would often actually lead to no bad results. But it is impossible to draw the line beforehand. Arbitrary rules are essential; those which we have now recommended can always be easily carried out, and their strict observance ought always to be insisted on.

Measures to be taken if more cases of Cholera occur.

477. If more cases of Cholera occur, this must be looked upon as proof that further precautions are necessary. The extent to which these precautions must be carried will vary according to circumstances.

We desire to give to the local Authorities every discretion which can safely be left to them, but experience has shown, beyond the possibility of doubt, that this discretion must be limited. It is, on the one hand, certain that if Cholera in an epidemic form attack a body of Troops, there is only one remedy in which confidence can be placed,—removal from the infected locality.* On the other hand, it is clear that the application of this principle requires care and judgment. To send men unnecessarily away from their Cantonments into camp, at perhaps the hottest and most unhealthy season of the year, is, on many grounds, seriously objectionable.

The question whether such a measure is or is not necessary must turn upon the point whether there is or is not reason to believe that Cholera has appeared among the men in an epidemic form. To determine this will not always be easy, the actul symptoms of sporadic cases being usually the same as those which usher in an epidemic outbreak The practical difference between the two forms of the disease is, neverthe-

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"the manner described in paragraph 492. The latrine, urinary, and wash-house used by the "man who was attacked, should be instantly closed, and their use must not be permitted "until they have been completely purified. The work of cleansing these buildings must be "carried out without the least delay, in the most careful manner that can be devised. "Chloride of Lime, or Condy's Fluid, or other disinfectant, should be freely used. All filth "and rubbish from the latrines must be buried at a distance, and all vessels used for their "removal must be carefully cleaned at the place where the refuse is deposited.

"475 A. If the principal Medical Officer on the spot has determined that the cases "of Cholera which have occurred were sporadic, it will be left to him to decide how soon "the men who may have been removed from the room or building in which the disease "appeared shall be allowed to return to it. If the cases have been determined to be "epidemic, the rules laid down in paragraph 477 and in the subsequent paragraphs will be applicable."

* Vide Sec. II, paras. 431 to 448.

less, so far as our present objects are concerned, a real one, and the difficulty of making the distinction will generally be much reduced if immediate intelligence regarding the appearance and progress of the disease be systematically sent, as we have proposed, from every station. When there is any unusual prevalence of Cholera in neighbouring parts of the country, or diarrhœa is common in the station, it will be generally prudent to assume the epidemic character of the disease.

Principal Medical Officer to decide whether Epidemic Cholera has appeared.

478. The decision of this question must rest with the principal Medical Officer on the spot. If he be of opinion that the cases that have occurred are in all probability sporadic, and that no cause is apparent for supposing them to be epidemic, removal from Cantonments need not take place.

If Cholera appear epidemically, men among whom the disease has shown itself to go into camp.

479. It must be distinctly understood that it is only upon the grounds which we have now stated that the question of the necessity for the removal of the men into camp can be discussed. If it be admitted by the principal Medical Officer that there is reason for apprehending an epidemic outbreak, no option will then remain; the men among whom Cholera has appeared must immediately be sent into camp. This must be laid down as a positive standing order, under which no choice of action exists, which must be carried out under all circumstances, whatever be the state of the weather, or whatever other objections may be made. Further, to obviate the possibility of this most important measure being improperly delayed by any peculiar views regarding the epidemic character of the disease, it must be ordered that if within one week after the first case of Cholera two or more other cases occur, it shall be considered that the disease has assumed an epidemic form, and the men must be removed accordingly.

Discretion left to local Authorities to determine extent to which removal into camp is necessary.

480. In determining to what extent the removal of the Troops is necessary from a station in which Cholera has appeared, we must again leave a certain discretion to the local Authorities. It is not always necessary, or advisable, that the whole of the Troops should be sent into camp when Cholera, even in a form admitted to be epidemic, has shown itself in a station. The principle upon which the necessity for removal rests is, that Cholera evidently attaches itself to particular localities. The same facts which show this to be true, prove that even during the most violent Epidemics, there is not necessarily any general cause in operation which renders all persons in the neighbourhood of the places that have been attacked specially liable

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to the disease. It frequently happens, as we have already shown, that while one part of a station suffers severely, another part escapes altogether. The principle to be borne in mind is, therefore, this, that the particular locality in which Cholera shows itself must be looked upon as dangerous; that it must be immediately abandoned, and all communication with it stopped; and that the men who have been exposed to danger by their occupation of the place in which the cause of the disease is presumed to be present, must be separated from the rest of the Troops. The constant tendency of Cholera is to localize itself in particular places, and among particular bodies of men, and every effort must be made to turn this fact to useful account.

The particular body of men among whom Epidemic Cholera appears must be sent into camp.

481. All, therefore, that need be laid down as an invariable rule is that the particular body of men among whom Cholera has appeared in an epidemic form must be removed from the Cantonments. If, for example, this body consist only of the inmates of some one building,* the measure need only be applied to them; if some particular Company or Troop be attacked, it will be similarly dealt with. A whole Regiment, or the whole of the Troops at the station, need only be sent into camp when it is found that the measures already adopted have not stopped the progress of the disease, or there is reason to fear that they will be insufficient.

Further precautions left to discretion of local Authorities.

482. It does not follow, because the local Authorities must not do less than we prescribe, that they may not do more. The precautions which we advise are those that appear essential in all cases, and we believe that they will ordinarily be sufficient. But it may happen that an outbreak of Cholera commences virulently; that cases occur in rapid succession among different bodies of men in various parts of the Cantonment; or that for some other reason there is cause for apprehending that the disease may become generally prevalent. Under such circumstances, the minimum of precaution that we prescribe may not be enough, and it may become the duty of the Military and Medical Authorities to take vigorous measures for the immediate removal of the whole of the Troops, including those among whom no cases of Cholera have actually occurred.

Rules applicable to women and children.

483. The rules that have now been proposed, as well as those which follow, are equally applicable to the women and children, if Cholera should appear in their quarters.

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* "For the word 'building', substitute 'room or building'."

Preparations for moving into camp to be made beforehand.

484. Preparation for moving the whole of the Troops, if necessary, into camp ought to be made directly; there is reason to suppose that Epidemic Cholera has appeared, or that its attack is imminent. Everything must, as far as possible, be considered beforehand, so that when the necessity occurs, there may be no doubt regarding the course to be pursued, and no reason for delay. Discretion will be required as to the proper encamping-ground to be chosen. The vicinity of places in which Cholera is prevalent will, of course, be avoided.

Cots to be taken into camp.

485. If the weather be wet, cots should be taken into camp for all the men, so that there may be no necessity for their sleeping on damp ground.

Marches to be short.

486. Marches should always be short. It is of the utmost importance that unnecessary fatigue and exposure should be avoided, and everything possible should be done to keep the men cheerful and in good spirits.

Immediate benefit from change not always to be expected.

487. Immediate apparent benefit is not always to be expected from the movement into camp. It is clear that men often take with them the seeds of Cholera, and although the immediate cessation of the disease is by no means uncommon, it is unreasonable to suppose that this will always be the case. Even if the first apparent result be an aggravation of the disease, this need cause no discouragement. It ought to be considered that, in all probability, the virulence of the disease would have been greater if the men had remained in their barracks.

Removal of camps.

488. We do not advocate the regular periodical removal of the camps under all circumstances. We think that on arrival at the first camp, there should generally be a halt of three or four days. If there are no fresh cases, or very few, there is no necessity for further marching, provided that the arrangements for the conservancy of the camp are carried out in a thoroughly efficient manner. Change of ground may generally be made without moving to a distance. These are matters which must be decided at the time according to circumstances. If the disease continue to be virulent for more than three or four days, the Troops should move.

Conservancy of camps.

489. The strictest possible attention must be paid to the conservancy of the camps.

The system usually adopted for latrines in camp is, with proper management, entirely satisfactory. Trenches should be dug to leeward,

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and tents pitched over them, and all filth should be instantly covered with earth. With proper care nothing offensive need be perceptible.

A similar system should be adopted for the camp-followers and other Natives. The strictest regulations must be laid down and enforced by the Commanding Officer, to ensure attention to this generally neglected matter.

Water-supply.

490. Wells should be cleaned, and the water drawn off, whenever they have not been in constant use. The utmost attention must be paid to the quality of the drinking-water. At encamping-grounds which have been frequently used, and which are situated upon great thoroughfares, caution will be especially necessary. It will often be desirable to sink temporary wells, so that there may be no danger of water contaminated by organic matter being supplied to the Troops. This will, generally speaking, be easy, and the expense will be very trifling.

In Cantonments also, this is a precaution which, during the prevalence of Cholera, it may often be desirable to adopt, for, as we have stated already, the quality of the water in our Military stations must sometimes be looked upon with great suspicion, and the evidence can hardly be doubted which has been collected to show that the drinking-water is at least one means by which the disease is occasionally diffused.*

Return of Troops to Cantonments.

491.† It not unfrequently happens that Troops are allowed to return to Cantonments far too soon, and the consequence is the re-appearance or aggravation of the disease. There must be an absolute prohibition against returning to Cantonments, under any circumstances, until at least ten days have elapsed after the disappearance of Cholera from the station, and until every measure for the purification of the buildings has been

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* "Add to this paragraph the following words taken from the Memorandum by Dr. "Budd, printed in the Appendix:—'When any doubt exists as to the quality of the "drinking water, it should be boiled and filtered through charcoal before use.'"

† *Para.* 491.—We propose to alter this paragraph as follows:—

491 A. "It not unfrequently happens that troops are allowed to return far too soon to "Cantonments, or to buildings which have been attacked by Cholera, and the consequence "is the re-appearance or aggravation of the disease. The return to Cantonments must "only be allowed with the greatest caution. No part of the Cantonment from which the "disease has not altogether disappeared should be re-occupied. Under no circumstances "can the re-occupation of any building which has been attacked by Epidemic Cholera be "allowed, unless at least ten days have elapsed since the last case of Cholera in the building, "nor until every measure for the purification of the building has been carried out. The "prevalence of fever or other diseases in camp is no reason for returning to Cantonments "while danger from Cholera remains. It must be accepted as the lesser evil of the two."

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carried out. The prevalence of fever or other diseases in camp is no reason for returning. It must be accepted as the lesser evil of the two.

Purification of buildings.

492. When Troops are sent into camp, all the buildings occupied by them in Cantonments should be thoroughly purified without the least delay. The walls, floors, and punkahs should be scraped and lime-washed; the woodwork should be painted; furniture, punkah fringes, and ropes washed, and generally everything possible done for the complete purification of every building. Special care should be devoted to cleaning the latrines, urinaries, and wash-houses. Chemical disinfectants should be freely used. Until the purification of the buildings is complete, the Troops should, under no circumstances, be allowed to re-occupy them.

Communication with infected places to be stopped.

493. Communication should be stopped, as far as possible, between the camps and Cantonments, or other places supposed to be infected with the disease. The hospitals in particular should be isolated to as great an extent as may be practicable.

Hospital management.

494. The question of hospital management during the prevalence of Cholera is one of urgent importance. The present Report shows to what a terrible extent, during the late Epidemic, the hospitals became the sources and foci of disease, and no measures of precaution are more necessary than those which may prevent the repetition of such lamentable occurrences.

In carrying into effect the measures which we are about to propose, the principles upon which they are founded must be constantly borne in mind. These have been fully explained in the preceding Section of our Report.*

Fatal results during Cholera Epidemic of existing system of hospital treatment.

495. We have shown that the existing system of treatment in hospitals is entirely inapplicable during Epidemics of Cholera; that its result is the aggravation of the disease by creating and fostering the very conditions which ought to be avoided, and that in consequence of the dread with which the men necessarily and rightly look upon the hospitals, they receive no Medical treatment in the only stage of the disease in which Medicine is of much value. The concentration and accumulation of men in the hospitals leads to the most fatal consequences. This is a fact which must be accepted, whether we agree or not regarding the manner of accounting for it.

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* Vide Sec. II, paras. 401 to 416, and 424.

Precautionary measures in hospitals before the appearance of Cholera.

496. Precautionary measures in the hospitals must be commenced, whenever it may be possible, before the actual appearance of the disease. We have already noticed the necessity of vigilant attention to the health of men in barracks, when the attack of Epidemic Cholera is supposed to be impending. All slight symptoms of disease must be treated in the barracks, or in other buildings, without compelling the men to remain in hospital.*

Details left to discretion of Officers on the spot.

497. We need say little regarding the exact manner in which this system should be carried out. All details must be left to the discretion of the Surgeon of the Regiment and the Commanding Officer. If the duty be gone through in a perfunctory manner, it will fail. The men will themselves give every assistance if they feel that the measures which are taken have been prompted by an anxiety for their good, and if they find that the practical result is beneficial. A Medical Officer can hardly give a better proof of his efficiency than by showing himself able to carry out successfully these measures of precaution. He may do much in the way of prevention; in the way of cure, after prevention has failed, he can do little.†

Vigilance required in hospitals.

498. In the hospitals themselves, the utmost vigilance is at this time necessary. No sanitary precaution must for a moment be neglected; no approach to anything like crowding must be permitted; all unimportant cases, the treatment of which in hospital is not essential, should be discharged. Every case in the hospital must be carefully watched, and the Surgeon must never lose sight of the fact that in very numerous instances it is in the hospital, among patients under treatment for other diseases, that Cholera first appears.

Separate temporary hospital to be prepared for Cholera cases.

499. If no separate building can be set apart as a temporary hospital, tents should be pitched for the purpose in some convenient place at a little distance. Every arrangement must be made, so that if a case of Cholera should occur, it may be immediately removed there, and not be treated in the regular hospital. Medicines and everything considered requisite for the treatment of the disease, should be prepared in the temporary hospital, and a portion of the Establishment should be

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* " Add to this paragraph :—

" When other buildings entirely separate from the hospital can be made available, they " should be used for this purpose as Observation Wards."

† Vide pages 133 to 140.

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kept in readiness to be transferred there. Thus, if a case of Cholera occur, the means will exist for separate treatment, and subsequent frequent communication with the regular hospital will be unnecessary.

Measures to be adopted on appearance of Cholera.

500. If, notwithstanding all precautions, Cholera should appear in an epidemic form, the system of inspection and precaution in barracks must be carried out with redoubled vigilance. The Medical Officers should devote their whole time and attention to efforts for the prevention of Cholera. Trifling cases of ordinary disease ought at such times to be considered of very little importance. They should receive a palliative treatment in barracks or in camp. It is far better that they should receive no treatment at all than that they should be admitted into hospital.

Separation of Cholera patients.

501. No patient attacked by Cholera should ever, under any circumstances, be placed in the same ward with patients suffering from other diseases. This invariable rule should equally apply to sporadic cases of Cholera. Room must be found, either in the hospital itself, or in some other building, or, if this is impossible, in a tent. Even if we put aside all other reasons, the cruelty of bringing into the midst of the sick a patient suffering from a disease with symptoms so terrible as those of Cholera, cannot be too severely reprobated.

Abandonment of hospital buildings if Cholera occur in them.

502.* If a patient in a Regimental Hospital suffering from another disease be attacked with Cholera, or if a case occur among the hospital at-attendants or others, under circumstances which render it probable that the Cholera had its origin in the hospital, the same system must be adopted which has been prescribed in the case of Cholera appearing in other buildings occupied by the Troops. The ward in which the case occurred should not be re-occupied during the prevalence of the Epidemic. If more cases occur, the hospital buildings should either be abandoned

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* " *Para.* 502.—This paragraph requires to be modified, so that it may correspond " with the rules proposed in the new paragraphs 473 A, 474 A, and 475 A. We propose to " alter it as follows:—

" 502 A. If a patient in a Regimental Hospital suffering from another disease be " attacked with Cholera, or if a case occur among the hospital attendants or others, under " circumstances which render it probable that the Cholera had its origin in the hospital, " the same system must be adopted which has been prescribed in the event of Cholera " appearing in other buildings occupied by the troops. (Para. 473 A *et seq.*) When " Epidemic Cholera has thus attacked a hospital, the ward in which the disease has shown " itself must be immediately abandoned, and every precaution laid down with respect to " other buildings must be taken. It is left to the senior Medical Officer on the spot to " determine, subject to the conditions contained in paragraph 504, to what extent patients " in a hospital which has been attacked by Epidemic Cholera should be removed into Camp."

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altogether, or reserved for the reception of patients in the advanced stage of Cholera, whose recovery is considered hopeless.

Treatment of Cholera cases in tents.

503. For the treatment of patients suffering from Cholera, we believe that tents are unobjectionable at all seasons of the year. They have, indeed, some important advantages. It is difficult, even with the utmost care, to keep a Cholera ward in a satisfactory sanitary condition; the air in a tent is less likely to become contaminated, and the ground can be changed as often as may be desirable.

Separate hospitals in camp.

504. When Troops are sent into camp on account of an outbreak of Cholera, all ordinary sick capable of being removed without evident danger should go into camp also. Separate hospitals should always be organized in the camps, and under no circumstances should patients be brought for treatment from the camps to the hospital in Cantonments.

Force to be broken up as much as possible.

505. If the plans that have been recommended are properly carried out, it will probably not often be necessary to send the whole of the Troops into camp at once. When, however, this is essential, the force should be broken up into as many separate detachments as may, under the circumstances, be practicable, and a separate Hospital Establishment assigned to each party. When the Troops are sent out in detachments from time to time, they should, in the same way, be kept, as far as possible, separate from each other.

Prevention of fresh cases more important than Medical treatment.

506. If, in spite of every effort, the sub-division of Hospital Establishments should lead to difficulty in the medical treatment of the disease, this must be accepted as the lesser of two evils. The difficulty of affording medical treatment to patients suffering from Cholera cannot be admitted as a reason for omitting to carry out precautionary measures. It must always be borne in mind that the main object during an Epidemic of Cholera is the prevention of fresh cases, much more than the medical treatment of those who have already been attacked; that prevention is often possible, but that treatment is almost useless after virulent symptoms have appeared.*

Temporary increase of Establishments.

507. The principal Medical and Military Authorities appear already to possess sufficient power of increasing Establishments on the occurrence of emergencies, and of transferring Medical Officers and Hospital Subor-

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* Vide Sec. II, paras. 425, 426 and 437.

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dinates from one station to another. They should be encouraged to take upon themselves without hesitation all such responsibility. They should at the same time remember that every man who is needlessly sent to do duty in a hospital helps to aggravate the evil.

Full authorized number of Medical Officers to be maintained.

508. We recommend no permanent increase to existing Hospital Establishments, but it is very necessary that the number both of Medical Officers and of Hospital Subordinates should never be allowed to fall below the authorized strength. Under the system which we propose, we believe that a violent outbreak of Cholera will not very often occur without previous warning, and, while no Cholera is present, attention should constantly be directed to the possibility of its appearance. We repeat that the foundation of all useful measures is the conviction of the Authorities at every station that they may at any moment be called upon to meet the attack of Cholera. To enable them to do this properly, a sufficient Medical Staff must always be available.

Leave of absence not to be granted during Epidemic of Cholera.

509. During the prevalence of Epidemic Cholera, no Medical or other Officers should ordinarily be allowed leave of absence, except on medical certificate.

Danger of employing European Soldiers on hospital duty.

510. The facts stated in the preceding Sections of our Report show the extreme danger of the system under which European Soldiers are employed, during the prevalence of Cholera, as Orderlies in attendance upon the sick in hospital. It has been proved by experience that this duty can be performed by Natives thoroughly well, and that they are far less liable than European Soldiers to be attacked by Cholera. It has been found that the Soldiers themselves feel no dislike whatever to be attended by Natives. The most difficult part of the duty usually to be performed, the application, during painful cramps, of friction and shampooing, is indeed one which Natives understand much better than Europeans.

Employment of Native servants in attendance on Cholera patients.

There will seldom be any real difficulty in obtaining Native servants for this work. The class employed as ward coolies are generally willing and competent to undertake it. These men receive Rs. 4 and sometimes Rs. 5 per mensem. Something may with advantage be done to improve the position of this class of servants. Additional pay should at least be given to them during the prevalence of an Epidemic, in consideration of the additional duty they are called upon to perform, and to encourage others to come forward during the pressure of an emergency.

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An Epidemic of Cholera seldom lasts in a virulent form for any considerable time, and looking upon the question merely as one of economy, it would be far cheaper to pay each Native servant 50 Rupees a month than to expose European Soldiers to this dangerous duty. The employment of Natives in the manner that we recommend is in operation in the General Hospital at Allahabad, and it has been successfully practised in many other places. A certain amount of European superintendence will, of course, be necessary. If the Officers who have to supervise the execution of the plan be men possessing some Indian experience, and knowledge of the people and of their language, it will seldom be found difficult to carry it into effect.

Employment of European Soldiers in hospitals to be discountenanced.

511. The employment of European Soldiers as Orderlies in hospitals during the prevalence of Cholera should be strongly discountenanced. Although we are not prepared to say that the practice can at present be absolutely prohibited, it ought only to be permitted under very exceptional circumstances, and every effort should be made for its complete abolition. We look upon this as a matter of the greatest importance.*

Female nurses for attendance on women and children.

512. For attendance on women and children suffering from Cholera, Native female nurses should, if possible, be obtained.

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* "The whole subject of hospital attendance and nursing in India requires consideration. "Many changes are doubtless necessary. Pending the introduction of a better system, we "recommend the addition of the following rules to paragraph 511. They will protect the "men against excessive fatigue and exposure while unavoidably employed as hospital orderlies:—

"When the employment of European Soldiers as orderlies in hospitals during the "prevalence of Cholera is considered unavoidable, men will be selected from the regiment, "as far as possible by volunteering, in such numbers as the Medical Officer in charge, in "communication with the senior Medical Officer on the spot, shall deem necessary. No man "who is not in good health shall be thus employed. The complete tour of duty shall in no "case exceed twenty-four hours. No orderly shall be kept in actual attendance in the "hospital for a longer period than four hours at one time, nor shall he have a less interval "of rest than six hours between successive tours of duty, whatever be the period of attendance in the ward. A room entirely separate from the hospital buildings must be provided "for the accommodation of men relieved from attendance on the sick, in which they can "remain until their tour of duty again comes round. Men not upon actual duty are not "to be allowed to remain in the hospital. The strictest precautions must be taken to "prevent men employed in the hospital from making use of the latrines, urinaries, or "wash-houses used by the sick in hospital. The utmost care must be taken that the "hands of all attendants on Cholera patients be scrupulously cleaned, by means of sand "and water containing some disinfectant, or other thoroughly efficacious means, and that "if the clothes of any of the men should become soiled by Cholera discharges, they be at "once taken off and thoroughly purified. Every man employed as a hospital orderly in "attendance upon Cholera patients shall be provided with tea or coffee before and after each "tour of duty."

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Insufficiency of Hospital Establishments may be often supplied by economy of existing means.

513. Difficulties which arise from insufficiency in the number of Medical Officers, or Hospital Establishments, may sometimes be greatly diminished if the available resources are properly economised. We have observed cases which occurred during the late Epidemic, in which much embarrassment might have been avoided by the better application of the existing means. Thus, for example, if a Regiment is sent into camp on account of the outbreak of Cholera, and there should be a few patients who cannot possibly be moved, there is no necessity for wasting available resources by leaving a separate Regimental Hospital Establishment for them in the Cantonments. The sick should, under such circumstances, be transferred to another hospital. When a station is abandoned altogether, one small General Hospital will usually be sufficient for all the patients who must remain in the Cantonments.

Measures for preservation of cleanliness.

514. In proceeding to speak of the necessity of measures for the preservation of cleanliness, it must be noticed that many eminent Authorities believe that Cholera may be disseminated by the discharges from patients suffering from the disease.

Measures recommended by Dr. Budd.

We are indebted to Dr. Budd, who has been the principal advocate of this belief, for an interesting paper, in which he has communicated to our Commission his views upon the propagation and prevention of Cholera.* We desire especially to invite attention to the plan which he proposes for arresting Cholera among Troops in infected barracks. Regarding the propriety of the measures of precaution which Dr. Budd advises, we think there can be no question. Whether the theory be true or not, the scrupulous cleanliness upon which it insists must always be beneficial.

Use of chemical disinfectants.

515. We think that while carrying out, during the prevalence of Cholera, measures for the preservation of cleanliness, in the necessity of which every one will agree, it will be prudent to admit the possibility that the discharges from Cholera patients may have especially poisonous properties, and that efforts should be made to destroy those properties by means of chemical disinfectants immediately on the issue of the discharges from

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* Vide Appendix.

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the body.* In proposing the following measures, we have drawn largely upon Dr. Budd's Memorandum, and we desire to express our high sense of the value of the assistance which his recommendations have afforded us.

Independently of these reasons, the use of chemical disinfectants, during the prevalence of epidemic and contagious diseases, is a precaution which should never be neglected. There is doubtless much truth in the objections which have been made to the employment of disinfectants and of deodorizing preparations during ordinary circumstances. They serve to conceal impurities which ought not to be allowed to arise, and which can be prevented by proper care and cleanliness. During the presence of epidemic disease, there is less danger that they will be suffered to become a substitute for other precautions, instead of being, as they should be, an addition to them.

During seasons when Cholera prevails, chemical disinfectants should be freely used in all the latrines provided for the Troops, in Cantonments and in camp, and on all occasions on which their employment is indicated.

Removal of Cholera excreta.

516. The utmost care should be taken for the immediate removal of all Cholera excreta. The vessels in which they are received should contain some powerful disinfectant. They should never be emptied into the usual receptacle, or carried to the common latrine, but taken away separately, and the contents thrown into a trench dug for the purpose and reserved for this use. A man should be constantly employed in the duty of throwing fresh earth over all filth the moment it is deposited. This trench need not be distant. It is better that it should even be in the hospital enclosure, than that any accumulation of filth should be permitted, and, if it be too distant, there will always be a probability that the sweepers, to save themselves trouble, will not carry the vessels to the places assigned. The vessels should be thoroughly cleaned at the trench into which the filth is thrown. There need be nothing at all objectionable or offensive in a trench such as that which we recommend. The number of sweepers should be increased, if necessary, so that there may be no excuse for the neglect of this very important matter. The same plan should be adopted in camp.

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* The best disinfectants that can be used are probably Chloride of Lime, or Condy's Fluid (Permanganate of Potash). The latter possesses the great advantage of having none of the disagreeable smell or objectionable properties which sometimes seriously interfere with the usefulness of the former. For the purposes that are especially required during an Epidemic of Cholera, Condy's Fluid possesses great advantages. As a mere deodorizer, it is in some respects less efficacious than other compounds, because it has no power of preventing decomposition. For the latter purpose, Chloride of Zinc (Burnett's Fluid) and Carbolic Acid (McDougall's Powder) are very efficient. The alkaline manganates and permanganates, on the other hand, are oxidizing agents, which actually destroy the offensive organic substances, and they are therefore especially valuable when the object is not to prevent decay, but to get rid altogether of the products of existing decomposition.

Precautions during treatment of disease.

517. Every effort should be made, during the actual treatment of the disease, to get rid, as completely as possible, of all the discharges from the sick, or to render them innocuous. Attention to proper precautions on the part of the attendants must be enforced. Unless strict supervision be exercised, the sweepers and other Native servants will certainly disregard all the rules that may be laid down.*

Bedding and clothing used by Cholera patients to be destroyed.

518. All bedding and clothing used by Cholera patients should be instantly burned. The present system, under which a mass of filthy clothing is often carefully stored up until it can be condemned by a Committee, is most objectionable and dangerous. We have ourselves, on more than one occasion, found these accumulations of bedding and clothing, several months after Cholera had disappeared, collected together in the same room in which the regular supplies for the hospital were kept. Beds that have been occupied by Cholera patients should be immediately taken to pieces, the wood washed and painted, and the Newar, or plaited tape sacking, should be burned.

Removal of the sick and of the dead.

519. The arrangements for the removal of the sick from the barracks to the hospital are often very insufficient. We have frequently found that the dooly employed for this purpose has been also made use of for the removal of the dead. Where no hearse has been supplied, separate means ought always to be provided for carrying the dead to the burial ground.

Funeral parties to be discontinued during prevalence of Cholera.

520. During the prevalence of Cholera funeral parties should be discontinued, and the band should attend at no funerals, either of Officers or Men. This rule has usually been followed, but not invariably, and more than one case has been mentioned to us of the bad results produced by the melancholy music of the dead march sounding day after day through a station.

Attention to general health of the men; promotion of amusements, &c.

521. We need hardly say that special attention should be paid, during the prevalence of Cholera, to everything which can tend to the improvement of the general health of the men.

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* " Add to this paragraph the following words :—

"All discharges from the sick, including those vomited, should be received, on their " issue from the body, in vessels containing a saturated solution of some powerful dis- " infectant. The rules laid down in paragraph 511, for preventing the use of the hospital " latrines, urinaries, and wash-houses by Soldiers employed as hospital orderlies, and for " ensuring personal cleanliness, will be equally applicable to all other attendants upon the " sick. (Vide foot note, para. 511.)"

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Every effort should be made to relieve them from duties which cause needless exposure and fatigue; to ensure that their food is wholesome, and their clothing appropriate, and to promote every means of healthy amusement and occupation. Examples will be found in this Report of the benefit apparently derived during an Epidemic of Cholera from a well organized system, such as exists in some Regiments, for improving not only the physical but the moral and intellectual condition of the men. Such measures as these must be carried out perseveringly and constantly at all times; they cannot be suddenly adopted during the prevalence of an Epidemic, but their extreme value will then be found.

Supply of extra articles of diet during prevalence of Epidemics.

522. There are many articles of diet which can now only be obtained in hospital. These comforts, as they are called, should be freely supplied in the barracks during the prevalence of Cholera, whenever the Surgeon and Commanding Officer think proper. This is more particularly desirable for the women and children, to whom these little extras will be especially valuable. Even should the indulgence be abused, little harm will be done. An Epidemic of Cholera does not last long, and the cost to Government will be very trifling.

Preparation of Returns. Rules required.

523. Definite rules are required regarding the preparation of Returns of Cholera cases. Some Medical Officers, during the prevalence of an Epidemic, look upon almost every case of diarrhœa as one of Cholera in the incipient stage, and record it as such. Others call nothing Cholera unless there are unmistakeable and dangerous symptoms of the disease. The result is, that the Returns from one place are not fairly comparable with those of another. It may easily happen, that a system of treatment, which is shown by the Returns to have been peculiarly successful, has in reality completely failed.

No cases should be returned as Cholera unless certain symptoms are present. An arbitrary line must be drawn. At the same time it is important that a distinct record should be kept of cases of diarrhœa or of other diseases which appear to be in any way connected with the prevalent Epidemic.

The introduction of a uniform system is desirable, that shall be applicable not only to India but to England and the Colonies also. We recommend that the attention of the principal Medical Authorities be drawn to the subject, in order that appropriate rules may be laid down.

Necessity for organizing a proper system of sanitary administration.

524. In concluding this Report, we desire again to notice the necessity of measures for the gradual removal of the ignorance which now prevails regarding almost every matter of sanitary import-

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ance in India. So long as this ignorance remains, it is useless to hope that measures for the prevention of Cholera or of disease generally among our European Soldiers can have any sort of completeness. Up to the present time, we have hardly made a beginning in laying even the foundations of true sanitary knowledge. We require the registration of deaths; the observation, on a regular and uniform plan, of meteorological phenomena; the record of facts to show the nature of the relations which exist between variations of climate and season; the rates of mortality, and the prevalence of disease; and generally the systematic accumulation of knowledge regarding matters that affect the public health.

At the present time we know almost nothing regarding the real sanitary conditions even of the places at which our European Troops have been stationed for a long series of years. There hardly exists, as we have already noticed,* a satisfactory account of the climate of a single place in the whole of Northern India. The principles upon which our barracks and hospitals should be constructed, or our plans of conservancy carried out, remain doubtful and undecided. If we wish to ascertain a matter so apparently simple as that of the comparative healthiness of various Cantonments, we find it scarcely possible to come to any conclusion, so obviously deceptive and full of error are all the available data. Regarding the effect of climate and of other causes on mortality and disease among the Native population, we know literally nothing.

The first thing that we require is, therefore, the means of obtaining some insight into the laws upon which public health in India depends.

It is not in this branch of the subject alone that comprehensive views are necessary. If we desire to render the sanitary condition of our European Soldiers really satisfactory, we must not, when we come to practical measures of improvement, ignore, as we have hitherto done, the existence of the masses of Native population in the midst of which our Soldiers must generally live. It is hopeless to expect that we can guard against the attacks of epidemic disease by any amount of care in our Cantonments, if every sanitary precaution is neglected in the Native cities and towns close by. For practical purposes we may consider that in this respect up to the present time nothing has been done at all. Here and there an active Magistrate carries into effect some not unimportant measure of sanitary improvement, but its benefits seldom continue for any length of time. It happens, as often as not, that his successor takes no interest in such matters, and allows everything to revert to its original state. So it is in our Cantonments. Some Commanding Officers

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* Vide Sec. II., para. 335.

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shew themselves to be fully aware of the importance of measures for the prevention of disease; others, perhaps in the same station and at the same time, look with indifference upon everything of the kind. Notwithstanding the extraordinary progress which Sanitary Science has lately made in England, public education in this respect remains generally at a very low ebb. We have passed the time in which people venture to deny the importance of these questions, but there is not yet a general recognition of their urgent practical necessity. The isolated and uncombined efforts of individuals can do little. Until the importance of all questions which concern the public health be distinctly acknowledged by the Government, and measures be taken for establishing a properly organized system of sanitary administration upon uniform principles, we shall arrive at no satisfactory results.

This is not the proper place for entering into further details regarding this subject, but we believe that there would be little difficulty and little expense in carrying out measures, which, although they might not be complete, would nevertheless be of the highest present utility, and which would serve as the commencement of a work the benefit of which would go on constantly increasing. Throughout the whole of Northern India, not only in our Military and Civil stations, but in the Native cities and villages, machinery already exists which might be made available for the collection of the facts which form the basis of sanitary knowledge. To a great extent it is even true that the money necessary for carrying out practical measures of sanitary improvement is ready also. The municipal and local funds that are actually available for such purposes are very considerable, and they are capable, under proper management, of being largely increased, without any pressure upon any class of the community, and without the introduction of any new system of local taxation.

Whatever expenditure it might be necessary for the Government to incur in turning to useful account the means which already exist, and in establishing a comprehensive system of sanitary administration, there can be no doubt that, putting aside all other considerations, such expenditure, if judiciously conducted, would be in reality an absolute economy of money. It cannot be too constantly borne in mind that the rate of mortality among our European Soldiers in India has hitherto been more than six times as great as it is among Englishmen of the same ages at home.[*] The average rate of mortality from Cholera alone is actually

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[*] *Note by the President of the Commission*, 1864.

The rate of mortality during the last five years has been much lower than this, and there seems every reason for hoping that the improvement will be permanent.

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higher than that which prevails in England from all causes of every kind. It may be asserted without hesitation that at least half of the present mortality of the Army is due to causes which might be prevented. The constant waste of money is enormous which this constant waste of life entails.

With regard to Cholera in particular, there is no apparent reason why means may not hereafter be discovered for its prevention, as effectual as those which we already possess for the prevention of small-pox. Although we cannot say that any measures which the Government of this country could undertake would probably lead to this result, there is nothing unreasonable in the hope that they might form one step towards it. This at least we may confidently believe, that it is even now in our power, by help of the means which Sanitary Science affords us, to place an effectual check upon the destructive Epidemics which at short intervals commit such havoc among our Soldiers and among the people of India.

Recapitulation.

525. In conclusion, we may recapitulate the principal conclusions which we have formed, and the measures of precaution which we recommend the Government to adopt.* We are of opinion :—

That wherever during the late Epidemic an excessive mortality occurred among the European Troops, it was obviously due to causes which might have been avoided; that it is in our power, in a great measure at least, to prevent such needless aggravation of the disease in future; that measures of general sanitary improvement, although urgently required, will not be alone sufficient, but that measures having a special applicability to Cholera are also necessary; that in the uniform character of the facts which Epidemics of Cholera in Northern India present, we may find a sound basis for special measures of prevention.

That we must assume that the attack of Cholera is always imminent; that vigilance must be constant; and every preparation made in anticipation of the outbreak of the disease.

That outbreaks of Cholera being seldom simultaneous in different places, notice of the appearance of the disease in any station must be immediately sent by Telegraph to the neighbouring Divisions of the Army; that the Civil Authorities must be held responsible for communicating to the Military Authorities information of the appearance of Cholera among the Native population within their jurisdictions.

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* The modifications in these rules which have been made by the Sanitary Commission for Bengal must be borne in mind, It has not been considered necessary to refer to them again.

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That when an attack of Cholera is apprehended at any station, every ordinary sanitary precaution must be taken, but that this is not a proper time for attempts at improvement which involve the stirring up of possible sources of disease; that measures must at such times be taken for paying the most vigilant attention to the health of the men in barracks, and for treating there all slight cases of diarrhœa and other disease.

That the constant tendency of Cholera is to localize itself in particular places, and among particular bodies of men, and that every effort must be made to turn this fact to useful account, by the immediate abandonment of infected places, and by avoiding all unnecessary communication with them.

That in anticipation of the necessity of placing the Troops under canvas, suitable places must be selected beforehand at every station for encampments, special regard being had to the fact that it will ordinarily be during the rainy season that the encamping-grounds will be required; that when in the vicinity of any station, buildings suitable for refuges exist, they should also be made available for the temporary occupation of Troops; that very little or no permanent charge to Government need be incurred on account of these encamping-grounds and buildings, but that such expenditure as may be absolutely necessary for placing them in a sufficiently good condition, and for keeping the approaches to them in sufficiently good order, should be sanctioned; that a careful record should be kept at every station, showing the situation and extent of available accommodation at every such encamping-ground or building.

That the removal of Troops during the prevalence of Cholera to places at short distances from the Cantonments will usually be as useful as to places further off; but that the Railways may be extremely valuable in moving men from one healthy station to another, through an intervening tract of country infected with Cholera.

That measures should be taken to ensure the provision of an adequate supply of camp equipage at each station.

That the Civil Authorities should be desired to give every assistance in their power in all matters connected with the supply of carriage and the march of Troops during these emergencies.

That whenever a case of Cholera occurs in any building occupied by European Troops, the room or portion of the building in which it occurred must be immediately vacated; its inmates removed to other buildings or tents, and separated from the men among whom the disease has not shown itself; that the vacated building must be thoroughly cleaned and purified, as well as all latrines, urinaries, and wash-houses attached to it; that it must not be re-occupied until ten days have elapsed, and until all measures of purification have been carried out.

That if Cholera appear in an epidemic form, the particular body of men attacked by it must instantly be sent into camp; that no deviation from this rule should, under any circumstances, be allowed; that it should be left to the local Authorities to decide whether this minimum of precaution is sufficient, or whether the removal of Troops from the station who have not actually been attacked by Cholera is also necessary.

That when the weather is wet, cots must be taken into camp for all the men.

That all possible precautions must be taken, both in the Cantonments and camps, to ensure a supply of water free from all suspicion of organic contamination.

That when Troops are sent into camp on account of the prevalence of Cholera, the necessity or otherwise of further movements must be left to the discretion of the local Authorities, but that under no circumstances must the Troops be allowed to turn to Cantonments until at least ten days have elapsed after the disappearance of Cholera from the station; that communication must, as far as possible, be stopped between the camps and Cantonments, and with all places supposed to be infected with the disease; and that communication with the hospitals in particular must be prevented.

That when Troops are sent into camp, all buildings occupied by them in Cantonments must be thoroughly cleaned and purified, and that until this has been done, the buildings must not be re-occupied.

That the ordinary system of treatment in hospitals is entirely inapplicable during Epidemics of Cholera, and that its evident result is the aggravation of the virulence of the disease.

That during the prevalence of Cholera, or when an outbreak of the disease is apprehended, every effort must be made to prevent the accumulation of men in the hospitals; that all slight cases of disease must, as far as possible, be discharged, and treated in barracks or not at all; that a systematic and vigilant inspection of the men in barracks must be carried out by the Medical Officers, with the object of discovering and treating all slight premonitory symptoms of disease, without sending the men to hospital; that a temporary hospital should be formed for the treatment of cases of Cholera, entirely separate from the regular hospital.

That no patient attacked by Cholera should, under any circumstances, be placed in the same ward with patients suffering from other diseases.

That if a patient in hospital under treatment for another disease be attacked by Cholera, the ward must be immediately vacated; that if more cases occur among the patients, the hospital must be abandoned altogether, or reserved for the reception of cases which are considered hopeless.

That when Troops are sent into camp, all ordinary sick capable of being moved must go into camp also, separate hospitals being formed for each camp.

That the Troops should be broken up into as many separate detachments as may be practicable; that prevention of Cholera is possible, while medical treatment is almost useless after virulent symptoms have appeared; that, therefore, the difficulty of affording medical treatment is no reason for the neglect of any measure of prevention.

That no permanent increase to existing Hospital Establishments is necessary; that the local Authorities already possess sufficient power of making such temporary additions as are required; but that the full authorized establishments should always be maintained.

That no leave of absence, except on medical certificate, should be granted to any Medical or other Officers during the prevalence of Cholera.

That every effort must be made to prevent the employment of European Soldiers on hospital duty during Epidemics of Cholera; and that Native servants be engaged for the purpose, increased pay being given when necessary.

That female nurses should, if possible, be obtained for attendance on women and children.

That the utmost care should be taken, during the prevalence of Cholera, for the preservation of cleanliness, and in particular, for the immediate removal of all Cholera excreta to places specially set apart for the purpose; that chemical disinfectants should be freely used on all occasions in which their employment is indicated; that all bedding and clothing used by Cholera patients should be immediately burned.

That more complete arrangements should be made for the removal of the sick to the hospital, and that separate means should be made provided for carrying the dead to the grave.

That during the prevalence of Cholera, funeral parties should be discontinued.

That every effort should be made, during the prevalence of Cholera, to relieve the men from needless fatigue and exposure, and to encourage every measure likely to promote their general health, their amusement, and occupation.

That hospital comforts should be supplied in barracks, during the prevalence of Cholera, when the Surgeon and Commanding Officer think proper.

That the principal Medical Authorities should be desired to prescribe appropriate rules regarding the preparation of Returns of Cholera cases, so that the Returns from one place may be fairly comparable with those of another.

That no measures for the prevention of Cholera or other disease can be complete, until a proper system of sanitary administration be organized, which may afford the means of obtaining an insight into the Laws upon which public health in India depends, and which may enable the Government to supervise, upon uniform principles, the practical measures of sanitary improvement which are required.

JOHN STRACHEY, *Civil Service.* PRESIDENT.
J. McCLELLAND, *Inspector General of Hospitals.* } MEMBER.

APPENDIX.

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APPENDIX I.

To

JOHN STRACHEY, Esq., *Civil Service*, ... PRESIDENT.
DR. LINTON, *Inspector General of Hospitals*, ...
J. MCCLELLAND, Esq., *Inspr. Genl. of Hospitals*,
LIEUT. COL. GAWLER, *Offg. Depy. Adjutant Genl., British Forces*,
MAJOR P. STEWART, *Bengal Engineers*, ...
MEMBERS.

GENTLEMEN,

I am directed to acquaint you that His Excellency the Governor General in Council has been pleased to appoint you a Special Commission of Enquiry, to investigate and report on the recent outbreak of Cholera among the European Troops in the several stations in the North-Western Provinces and at Meean Meer.

2. The Governor General in Council desires that the Commission shall meet at Lahore at the earliest practicable date, and that, after completing their enquiry at that place, they shall proceed to Umballa, Delhi, Meerut, Agra, and Gwalior, taking these stations in such order as may appear to them convenient, and reporting by Telegraph when about to proceed to any of them, diverging to Futtehgurh and to any other stations at which the European Troops have been attacked by this disease, and which are at no great distance from the places named.

It is to be remembered that the chief means of arriving at a practical result will be a careful comparison between the points of resemblance and difference in the circumstances of each place afflicted.

3. The Governor General in Council desires that a full and searching enquiry shall be made into particulars of every description, which can throw light on this severe and fatal attack of Cholera among the European Troops at so many stations, and more especially among those at Meean Meer.

4. The points to which your attention is more particularly required are such circumstances as may tend to develope the characteristics of the attack; its line of progress from one place to another; the mode in which its virulence has been checked, whether by moving the Troops into camp or otherwise;—the situation of the barracks, and whether the

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disease has been general in the Regiment or confined to particular Companies or barracks, or to portions of barracks;—the cubic space per man in each barrack, the nature of the ventilation in the barracks, and of the drainage in the neighbourhood; the description of privies, whether cesspool or surface, and how situated as regards their distance from the barracks and the direction of the prevailing winds, and whether the effluvia from the urinaries enter the barrack rooms;—what precautions are taken to have men who are ailing, though not ill or unfit for duty, brought before a Medical Officer;—whether the men are allowed to sleep outside or in the verandahs in the damp, without covering, or have been in the habit of exposing themselves to the rain in walking out or in going to and from the Canteen or Bazar, and of wearing damp clothes;—what amount of night duty the men have had to perform; whether they are exposed much in their night-duties, and whether spare Great Coats are kept in the Sentry boxes, so as to ensure a dry Coat when the one in wear is wet;—whether the men are provided with Cholera belts and wear them, and whether the clothing is of a nature suited to the season of the year.

5. The sanitary history of the Regiments for the last two or three years should be ascertained, and the stations they were at during that period.

6. The nature and amount of drill should also be a subject of inquiry;—at what hour the men are turned out,—whether kept on damp ground for any length of time,—or exposed to wet or to heavy dews, or to the influence of the sun;—whether it seems better that the men should turn out before or after sunrise, at certain seasons, so as to avoid exposure to fog and dews, and malaria, which prevail most in the early morning.

7. Another point of inquiry is, what class of men have chiefly suffered; whether old Soldiers or young ones; acclimatized men or men newly arrived in India; men of good or of bad character; spirit or beer-drinkers or water-drinkers; those who use vegetables abundantly, or others; men who have been on light duty, or others.

8. Attention is especially required to the nature and diet of the Soldiers; the descriptions of bread and meat and vegetables supplied;—what attention is paid to the cooking; the nature of the small articles supplied by the cook-boys; and whether the food is properly cooked, the tea and coffee properly made, and whether a change is daily made in the cooking, and what measures are adopted to insure this;—whether the men are in the habit of drinking country liquor, ginger beer, and other similar beverages, and whether any precaution is taken to insure the

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ginger beer, and drinks of that kind, being of good quality and free from acidity.

9. It is important to know what protection the men have against being furnished with indifferent rations; whether the Commissariat Officer and the Quarter Master of the Regiment, or any other Officers, make it a rule to point out when any article of food is objectionable, without waiting for objections being made by the men.

10. A further object of enquiry is, what amusements are available for the men;—what games out of doors and in doors;—and whether the men generally employ their spare time in these games, and in amusements, such as theatricals, &c., and in reading.

11. There will be other points of enquiry, which will probably suggest themselves to you; and I am desired to observe that no point should be considered too minute or trivial, the investigation of which may tend to show how the attack of the disease may be, in any degree, warded off, its virulence diminished, or its recurrence prevented.

12. It will be requisite that your Commission should draw up a full Report of your proceedings and investigations; and you will have the goodness to transmit that Report to this Department for submission to His Excellency the Governor General in Council.

I have the honor to be,
GENTLEMEN,
Your most obedient, humble Servant,

FORT WILLIAM,
The 31*st August* 1861.

(Signed) R. J. H. BIRCH, *Major Genl.*,
Secy. to the Govt. of India.

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APPENDIX II.

From Major H. K. BURNE, *Offg. Secy. to the Govt. of India, Military Dept., to* J. STRACHEY, ESQ., C. S.,—*(No.* 383, *dated* 14*th September* 1863.*)*

The Report of the Commission appointed to inquire into the causes and history of the Cholera Epidemic of 1861 in Northern India, of which you were President, having been laid before Government with the subsequent correspondence on the same subject, I am directed to convey to the Commission,—especially to yourself and to Dr. McClelland, whose labors were prolonged considerably beyond the period over which those of the other Members extended,—the warm acknowledgments of the Government of India for the zeal and earnestness with which the inquiries were conducted, and the patience and care with which the varying results of the investigation have been compared and practical conclusions drawn for future guidance.

2. To yourself in particular the Hon'ble the President in Council feels that the cordial expression of the approbation and gratitude of Government is due for the complete and able Report submitted, in which the proceedings of the Commission and the results of the inquiry have been so clearly placed before it.

3. This letter will be communicated to the other Members of the Commission, and the recommendations made will receive the fullest attention in connection with the Report of Lord Stanley's Commission on the sanitary state of the Army in India. In the meantime copies of the Report, and of the correspondence connected with it, will be forwarded for the information of the Right Hon'ble the Secretary of State.

From Major H. K. BURNE, *Depy. Secy. to the Govt. of India, Military Dept., to* J. STRACHEY, ESQ., C. S.,—*(No.* 322, *dated* 9*th March* 1864.*)*

With reference to communication from this Department No. 383, dated the 14th September 1863, I am directed to annex, for your information, the following extract, para. 24, of a Military letter, No. 22, dated 23rd January last, from the Right Hon'ble the Secretary of State for India, *viz* : "I fully concur in your opinion as to the value of the labours of the Cholera Commission, and in the acknowledgments which you have caused to be conveyed to Mr. Strachey, the President."

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APPENDIX III.

Memorandum on the propagation and prevention of Asiatic Cholera, by W. BUDD, ESQ., M. D., *Edinburgh, Senior Physician to the Bristol Royal Infirmary, communicated to the Commission through the Inspector General of Her Majesty's Hospitals.*

The conclusions to which I have been led regarding the spread of Asiatic Cholera may be stated in few words.

In their most general expression they are summed up in the two following propositions:—

1*st.*—That the disease is essentially contagious or communicable; and 2*nd.*—That it is disseminated (as I believe exclusively) by the liquid discharges from the intestinal canal of Cholera patients.

To understand clearly the power of a disorder, spreading in the way here assumed, to affect such large numbers of persons as those who suffer in a Cholera Epidemic, it is necessary to bear in mind the one great characteristic of the group of contagious poisons which give rise to acute diseases. I speak of the enormous multiplication which these poisons undergo in the living body as a result of the morbid process they set up. It is, in fact, this multiplication, and the disturbance attaching to it, that in each case constitutes the disease and destroys life.

In small-pox the work of reproduction is seen in results directly appreciable to the eye. The practice of inoculation has shown, by numberless instances, that, under certain conditions, a perfectly impalpable speck of the small-pox virus inserted into the skin may produce a disease, which, in the course of a few days, issues in the development of a new stock of the same virus, sufficient in amount to inoculate with small-pox myriads of other persons.

Although the fact is not open to evidence of the same precise order, yet I believe it to be equally sure, that in every case of Asiatic Cholera the Choleraic poison is multiplied in a ratio at least as great.

Cast off by the intestine of the Cholera patient, in the characteristic rice-water discharge, this poison may be transmitted to other and uninfected persons in the following principal ways:—

1*st.*—By the soiled hands of attendants on the sick, a mode of communication which is probably very common within the limits of the family circle.

2nd.—By means of bed and body linen, and other articles, tainted with the rice-water discharges; and

3rd.—Through the medium of the soil.

As the discharges are liquid, the great bulk of them necessarily finds its way to the ground. Thus deposited, the poison may take effect,—(*a*) by rising into the air with the products of evaporation; (*b*) by percolating into the drinking water; and lastly, by atmospheric dispersion, in the form of impalpable dust, after it has passed into the dried state.

That the disease may be communicated by poison in this last form is perhaps difficult to establish by direct proof. But in default of this, the case is one in which the evidence furnished by analogy is so close and weighty as to leave no reasonable doubt of the fact.

We know *by experiment* that other contagious poisons, (the vaccine the variolous, and the woorara poison, for example,) when dried, retain their properties in a dormant state for indefinite periods of time, recovering them entirely when moistened. We know by evidence, almost as certain as that of experiment, that the same is true of the poison of scarlet-fever, of that of malignant pustule, &c, &c. It would be contrary to all probability that it should fare otherwise with the Cholera poison; and in fact, in the numerous and well authenticated instances of infection, conveyed by articles of clothing, this poison, during its transport, must necessarily have been in many in the dried state. As this state is one which entirely protects organic bodies from molecular change, there would seem to be no definite limit to the time during which the morbific agent, having once passed into it, might retain its specific powers. If the foregoing premises be admitted, certain consequences may at once be deduced from them, which it is all important to note.

From the enormous multiplication which the poison undergoes in the living body on the one hand, and from the nature of its various modes of far-reaching distribution on the other, two things must necessarily follow. The first is, that, under given conditions,—and conditions that must often really happen,—a single case may give rise to a wide-spread infection; and, secondly, that, as cases multiply, it must, in numberless instances, be as impossible to trace their linear succession as it would be to trace that of particular generations of fungi or infusoria. In both examples, in fact,—in the disease as well as in the living organism,—the organic germs are disseminated, not only through the same media, but in the same modes, and by the same agencies. The necessary result is, that in both new specimens must be constantly springing up, whose direct parentage it is impossible to trace; and under circumstances which, to those who have not the key to the events, bear all the semblance of spontaneous origin. When matters have come to this pass, it is obvious that the diffusion of the disease will, for the most part, occur in an order entirely different from that to which the idea of contagion is commonly attached.

To apprehend clearly the course of events in a Cholera Epidemic, another element must be taken into account, namely, the extreme shortness of the period of incubation. In most other acute contagions, the average duration of this period is a fortnight or more: in Cholera it seldom exceeds three days, and where the disease is virulent, there is evidence to show that it may not exceed twice that number of hours. Hence the proportionately greater rapidity with which Cholera extends itself through an infected community.

The relative share which the various modes of dissemination here indicated take in the propagation of the pestilence must vary with season and climate; with temperature; with the habits of the people; the nature of the soil; with that of the water supply, and other sanitary arrangements. From what I can learn of Indian habits and of the arrangements which prevail in India, in regard to drinking water, it seems probable that in that country water contamination plays a very important part in it. In particular, there seems to be reason to believe that the use of water, infected with Choleraic germs, is answerable for the sudden outbreaks of the disease, which have sometimes been observed in bodies of Troops on march, and in which large numbers of men have been struck down almost at once. On the other hand, from the rapidity with which the rice-water discharges must often pass into a dry state, under the burning rays of a tropical sun, it seems highly probable also, that in India "Cholera dust," if I may use such an expression, has a large share in the work of propagation. As in most places where the disease prevails some germs must almost necessarily remain in a state of desiccation, it is easy to see how every Epidemic may leave behind it in a dormant form the seeds of a new outbreak co-extensive with the first.

The evidence which has led me to these various conclusions has been in part already published in a series of letters addressed to the Association Journal in 1854-55. Of these letters, I have the honor to forward an abstract, in the form of a communication to the Edinburgh Medical Journal, by the late Professor Alison, "on the communicability of Cholera by dejections." Since that date I have collected a great body of additional evidence to the same effect, which, I hope, in the course of time, to make public.

Meanwhile, it may be readily shown that the foregoing views explain, in the most natural way, almost all the leading facts which characterize the diffusion of this pestilence. They explain, in the first place, its relation to filthy habits and defective drainage; its predominance in low levels; its striking tendency to follow the natural line of watershed; and its communication to persons, who not only have never been in the presence of the sick, but who are stationed at a distance from them. If these views be just, the disease may be described, in general terms, as "a disease which infects the ground." It is impossible to look at any of the maps which have been constructed to represent particular Cholera outbreaks without at once recognising this characteristic. In all such maps, in addition to the "dots" which mark the occurrence of cases in single order, there are others which lie in such thick clusters as to look like a stain on the paper. These clustered dots always occur where drainage is either defective or absent, and the stain on the map corresponds to, and is the expression of, a miasmatic stain of the soil by the liquid poison.

In addition to these, some other circumstances of a very special kind have been observed in particular outbreaks, in which the coincidence between theory and fact is still more striking. Among these, perhaps the most remarkable relate to cases of public establishments for the reception of large numbers of both sexes, and in which the disease, in a particular outbreak, has been entirely confined to one sex. Many instances have happened in which, of large bodies of men and women, living under the same roof, eating the same food, drinking the same water, and breathing the same air,—sometimes, indeed, with only a partition-wall between them,—one sex has been decimated by Cholera, while the other has remained entirely exempt. The whole of this strange result may be accounted for by the fact that, in almost all such establishments, there is one common privy for either sex, which is devoted to its exclusive and separate use. The contamination of this privy by the rice-water discharges of the first casual case explains at once the whole mystery. The force of this example is the greater, because, under any other view, the fact appears to be entirely inexplicable.

The operation of tainted privies, in disseminating the disease in work houses, prisons, barracks, and other public establishments, is pointed out in one of the extracts which Professor Alison has given from my letter, in terms to which I have nothing to add.

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The theory that Cholera is disseminated by the dejections, seems also to be remarkably confirmed by the way in which its prevalence is related to rain-fall.

In Europe all the great Epidemics have occurred, as we should have expected them to do, in times of prolonged drought. Rain, by diluting the poison, and by giving rise to floods which rapidly sweep it beyond the inhabited area, seems to have a powerful influence in checking the disease. But to have this effect, the rain-fall must be heavy and continuous. There are many conditions under which it is readily conceivable that light and intermittent rains may, on the contrary, favor its spread. I have not yet completed my study of the history of Cholera in India, but I believe I am right in assuming that there also the seasons of great Epidemics have generally been dry seasons.*. Whether the cessation of the recent Epidemic, on the occurrence of the great floods which immediately succeeded to it, be more than coincidence, the details given by the papers do not enable me to judge.

Before concluding this part of the subject, there is one other peculiarity of the Cholera poison on which I desire to say a few words, as its recognition is essential to a clear understanding of some of the anomalies attaching to Cholera outbreaks, which have most perplexed Medical observers. I speak of the tendency of the poison, when in a moist state, to rapid, spontaneous decomposition.

In one of my letters to the Association Journal, in 1854, after entering into some speculations as to the actual nature of the morbific agent, I expressed myself in the following words :—

> "But if we are still in ignorance of the actual nature of the agent, there is one of its distinguishing properties about which there can be no mistake. I speak of its natural tendency, except under special conditions, to rapid decay and extinction. I have already drawn attention to the extraordinary rapidity of its development,—a rapidity unexampled in the case of any other contagious poison. Its tendency to decay appears to be rapid and unexampled in the same proportion. This is no more than we should have expected. Through the whole of organic nature, rapid growth and rapid decay are, of necessity, correlative terms.
>
> "What we should have concluded, as to this property of the Choleraic poison, as a matter of inference, is seen as a matter of fact on every hand wherever Cholera breaks out. Its consequences are exemplified in a thousand forms: broadly, in the short duration and rapid subsidence of particular Epidemics; and less broadly, but not less plainly, in the rapid disappearance of the disease in courts and other localities where it had lately raged, and where a large prey had seemed still to invite its deadly attack; yet more specifically in the rapid, spontaneous disinfection of infected linen, of which many striking instances might be recorded, to say nothing of numberless other facts to the same purport. It seems to be certain, in fact, that where the stock of poison is not renewed by renewed development

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(Note by Commission.)

* Vide Report, Sec. II., paras. 334 to 351.

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> in the bodies of living men, it cannot long subsist in the common conditions of the English climate. This is, no doubt, a reason why, although Cholera has made great havoc among us in certain favorable seasons, it has failed to establish itself permanently here. In India—the native home of the disorder—the atmospheric conditions appear to be more favorable to the preservation of the powers of the poison; partly, most probably, from the higher temperature of the climate; partly, too, from the operation of circumstances, which must often cause the poison to pass rapidly, immediately on its elimination from the human body, into the dried state.
>
> "It is from not having recognised its great destructibility, and rapid tendency to decay, as the special and distinctive character of the Choleraic poison, that physicians have been led to draw inferences from facts such as those just referred to, which the facts themselves by no means warrant."

These considerations (although they might, no doubt, have been better expressed,) I believe to be perfectly just. The powers of all the contagious poisons appear to be due to their being in an active state of metamorphosis, and to be proportioned to its intensity in each particular case. Where the conditions necessary to re-production are present, a rapid multiplication of the poison is the result; where they are absent, an equally rapid destruction of the original stock. The cells of yeast, when placed in a simple saccharine solution, enter into fermentation, and speedily perish. But if the same cells be placed in a similar solution, but one which contains as well the nitrogenous elements for their growth, the very same metamorphosis which led, in the former case, to their destruction, leads now to the development of a new brood.

Under this view, as applied to Cholera, the shortness of incubation, the rapid course of the morbid phenomena, and the rapid subsidence of the disease often observed in infected localities, are circumstances which have their root in a single condition, and are all mutually related. By reference to them, many of the peculiarities which distinguish Epidemics of Cholera from those of other acute contagions, may be readily explained, which would otherwise remain quite unintelligible.

I do not know whether I am warranted in assuming that the case, of which an outline has here been briefly sketched, is already a strong one on its own grounds. But, in addition to these, it has the support of analogy of no common force.

In every country in Europe, the almost perfect identity of the conditions which promote the spread of Cholera, and of those which are known to promote the spread of typhoid fever, has been made the theme of general remark.

In the Cholera Report of the London Royal College of Physicians, this identity, as regards one great class of conditions, is made the subject of a striking and elaborate parallel.

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In every successive Epidemic of Cholera which has visited England, the burden of the teaching of the English Board of Health has been, that Cholera and typhoid fever are the offspring of precisely the same sanitary defects.

Having this in view, I have ventured to enclose a series of papers by myself on the propagation of typhoid fever, containing evidence to show that the defects in question have the effect ascribed to them, only because this fever is (mainly) disseminated by the discharges from the diseased intestines of already infected persons. In other words, the striking family-likeness between the two diseases, as regards their mode of spreading, is due to the fact that typhoid fever also is "one of the great group of diseases which infect the ground."

It is, I need scarcely add, impossible, within the brief limits of a memorandum, to discuss the various objections which may be taken to the foregoing views. I may, however, state that having, in the course of many years' study of the problem, given my mind much to this aspect of it, I have hitherto met with no objection which would not apply with still greater force to any other mode of accounting for the facts.

I may further, perhaps, be allowed to take this opportunity of observing that where a theory rests on evidence of its own, facts that seem to be opposed to it, although they may possibly require some qualification of it, constitute no valid plea for its rejection.

It is well known, for instance,—to illustrate small things by great ones—that the theory of universal gravitation would never have been established if the minor difficulties which appear to stand in its way at the date of its promulgation had been allowed to prevail against it. The same thing is still more true of the undulatory theory of light. In this last case, indeed, there remain, even now, one or two outlying phenomena, which no one has yet been able to bring within the domain of the theory. That light is propagated by the undulations of an ether is not the less the scientific faith of Europe.

The preventive measures I would venture to suggest for checking the spread of Cholera are directly founded on the conclusions to which I have been led regarding its propagation. Their object would be to destroy, by means of chemical disinfectants, the poisonous properties of the discharges immediately on their issue from the body; and in places where this has been neglected, to remove, if possible, all uninfected persons from the poisoned ground.

The particular methods by which these ends may be accomplished are described in sufficient detail in the paper from the Edinburgh Medical

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Journal; and a memorandum in MS. (also enclosed), which I drew up some years ago, at the request of a friend, for arresting the spread of Cholera among Troops in infected barracks.

An important practical difficulty in the way of complete disinfection arises from the circumstance that in the last stages of Cholera the discharges are almost always involuntary. This difficulty may, however, be in great measure got over by placing, under the breech of the Cholera patient, a bag containing a sufficiency of Condy's or McDougall's disinfecting powder, to be changed as often as occasion may require.

In the absence of special disinfectants, a good deal may yet be done by one or two simple measures for limiting the sphere of the operation of the poison. It is an established fact that the noxious powers of animal poisons are destroyed by the temperature of boiling water. In boiling water we possess, therefore, a ready means for the disinfection of soiled linen, bedding, and other tainted articles. By digging a trench in the ground, in a well-chosen spot, for the reception of the rice-water discharges, and by covering each discharge as it is deposited by a layer of earth, these dangerous morbid products may be disposed of in a way that, at any rate, would prevent their having a wide-spread effect.

It may be well to add that these various measures, which are devised for the emergencies of actual disease, are in nowise intended to supersede the necessity for general sanitary improvements.

In all large public establishments there is one thing which should be made an essential part of their internal economy. I refer to the establishment of a separate cloaca for the reception of all discharges from sick persons. If the corresponding water-closet or latrine were provided with self-acting means of disinfection, the security would be all the greater. The contagious diseases which are communicated by exuvia from the intestine are so frequent and so rapid in their course as to leave no doubt that an arrangement of this kind would protect the inmates of such establishments from many a sudden and unforeseen outbreak.

I cannot conclude this memorandum without drawing attention to the very important works on the same subject by the late Dr. Snow. I was led to the principal opinions I hold respecting the propagation of Cholera before the appearance of his first Memoir and on entirely independent grounds. I had also taught, for many years, at the Bristol Medical School, the leading doctrines regarding the propagation of typhoid fever, which are enumerated in the series of papers herewith enclosed. But Dr. Snow was the first to announce publicly that Asiatic

Cholera is disseminated by the rice-water discharges, and to substantiate the statement by evidence which, for my own part, I consider to be perfectly conclusive.

Clifton, Bristol,
4th November 1861.
W. BUDD.

Plan for arresting Cholera among Troops in infected Barracks.

1*st.*—The Troops to be removed at once, if possible, from the infected barracks, and to be encamped on high ground.

2*nd.*—All who may be attacked after their removal to be separated from their healthy comrades the moment the first symptoms appear.

3*rd.*—All discharges from the sick (including those vomited) to be received, on their issue from the body, into vessels containing a saturated solution of chloride of zinc or some other powerful disinfectant.

4*th.*—The latrines or other places which serve as the final receptacles of these discharges *to be reserved exclusively for that use.*

5*th.*—All latrines belonging to the camp to be strewed, night and morning, with a mixture of peat charcoal and chloride of lime.

6*th.*—All tainted linen, bedding, &c., to be burnt immediately after its removal from the sick.

7*th.*—The hands of all attendants on the sick to be scrupulously cleaned (by means of sand and water containing some disinfectant,) whenever they have become soiled by "rice-water."

8*th.*—The utmost care to be taken in providing drinking water; and where any doubt exists as to its quality, the water to be boiled and filtered through charcoal before use.

9*th.*—The interior of the infected barracks to be fumigated with chlorine or sulphurous acid.

10*th.*—Existing privies, and the drains connected with them, to be built over, or otherwise abolished, where necessary, after a preliminary disinfection by the free use of chloride of lime or peat charcoal.

11*th.*—Convalescents to be kept for some time in separation from the healthy Troops.

Clifton,
November 1861.
W. BUDD.

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APPENDIX IV.

(Water-supply at Meean Meer.)

Extracts from a letter from the President of the Cholera Commission to the Secy. to the Govt. of India, Mily. Dept., Calcutta, dated 31*st May* 1862.

5. The Government will observe that Dr. Brown finds that a large amount of organic matter exists in all the wells at Meean Meer, and, with regard to one well at least, that he has given a decided opinion that the water has been contaminated by the cess-pools. He also finds that certain wells in the neighbourhood of the cess-pools contain sulphuretted hydrogen, whether they are regularly worked or not. Without attempting here to discuss the question of the probability of there having been any connection between the outbreak of Cholera at Meean Meer and the unwholesome character of the water, it is evident that the state of things which has been shown to exist demands serious attention.

6. In the evidence taken before the Commissioners appointed in England to inquire into the sanitary state of the Army in India, we find the opinion expressed, upon high authority, that when water contains 3 or 4 grains of organic matter per gallon, it must be looked upon as "approaching the line of danger." When, as in the present case, not only does the amount of organic matter often considerably exceed that amount, but we have, to say the very least, a strong probability that a portion of it is derived from the cess-pools, we think it clear that the line of danger has been passed.

7. That, as a matter of fact, the water of wells becomes easily contaminated by percolation from cess-pools, has been completely proved in England. Dr. A. H. Hassall gives as his opinion, based upon extensive experience, that water may become polluted by a large cess-pool at a distance of more than 100 yards. The distance of the wells at Meean Meer from the cess-pools is, in two cases, as we have stated in our Report, only 118 feet, and in other cases it is little more.

8. The following quotation from the third Report of the Medical Officer of the Privy Council for 1860, regarding an Epidemic of typhoid fever at Bedford, bears upon the same point, and sufficiently disposes of the question of the possibility that the organic matter in the wells of Meean Meer may have been in part at least derived from the neighbouring cess-pools. "The wells from which the inhabitants derive their supply of water for drinking and other purposes are frequently in close proximity with these cess-pools :—Almost the entire system of sewers, drains, and cess-pools in this town is one of percolation and saturation of the sub-soil,

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and it is almost impossible, with the liquid refuse of 13,000 people constantly passing into such a limited body of water as would be upheld in these few feet depth of gravel, that any portion of the supply could escape more or less pollution. Well aerated, cool, and sparkling as the water from the gravel usually is, that pollution may frequently escape detection, but it can scarcely fail to exist throughout the whole of the more thickly populated part of the town. A striking example of the distance to which foul matter will travel through this porous sub-soil came under my notice. The water from some wells situated at a distance of 500 feet from the gas-works, was so impregnated with soakage from the gas-tar refuse on these premises as to be most offensive, and quite unusable for any purpose. The flavour and smell of gas-tar are not readily got rid of, and are easily recognized. It is frequently otherwise with the more dangerous pollution from cess-pools, and Chemists agree that injurious matters in solution in the liquid of cess-pools are not removed by filtration through gravel, however bright and free from offence to the senses the water may become."

9. It is unnecessary that we should here enter into the question whether the late violent Epidemic of Cholera at Meean Meer was dependent in any way on the presence of poisonous matter which had percolated into the wells from the cess-pools. Whether this was or was not the case, the necessity of supplying pure water to the Troops is a matter of the highest importance. But we must not omit to notice the fact that a large amount of evidence has been collected in Europe to show that the character of the water-supply affects in a most marked degree the mortality from Cholera, and that many of the highest of our Medical and Chemical Authorities consider it to be proved to demonstration that water contaminated by sewage matter is a powerful agent in the diffusion of this disease.

10. It is true that the cess-pools attached to the latrines at Meean Meer have been for some time closed, and we believe that they have all been emptied. But it would be unwise to assume that this has removed all cause for apprehension. It is sufficient to read the description of the cess-pools to be convinced that the whole of the ground in their vicinity must have become contaminated, and we cannot assume that danger has ceased, although the constant aggravation of the evil is no longer going on. We are not aware whether the cess-pools attached to the urinaries and wash-houses are still in use, but we have received no information to show that they have been closed.

11. Regarding the proper remedies for the state of things which we have described, it is impossible for us to speak with confidence. To

enable us to do so, much more complete knowledge than we possess would be necessary regarding the quality and quantity of other water that could be made available for the use of the Troops. This much, however, is clear, that for drinking purposes the existing wells ought to be abandoned. We have been informed demi-officially by Dr. Brown, the Chemical Examiner at Lahore, that he is of opinion that the best plan that can be adopted is to draw the necessary supply from the neighbouring canal, the water of which, he states, is very much purer than that of any of the wells. If this plan were adopted, and a channel brought into the Cantonments from the canal, there would be little difficulty in passing the whole supply through a filter before its distribution. This appears not unlikely to prove the most desirable plan that can be adopted. Possibly, however, the construction of wells sunk to a great depth, and protected from the contaminations to which water near the surface of the ground is always liable, may be a preferable measure. The plan to be permanently adopted should be carefully considered, and it is desirable that no large expenditure of money should be incurred upon measures which may turn out to have been based on insufficient data. The matter of immediate importance is, that the supply of drinking water from the existing wells should be stopped, and that temporary measures be taken for affording a supply of the best water which can at once be made available. The local Authorities can determine what these temporary measures should be. They have the advantage of Dr. Brown's scientific knowledge, and they possess local experience of numerous matters which will have to be considered. Whatever plans be adopted, we strongly recommend that the use of the existing wells be relinquished. No attempt to purify the water by filtering or boiling can be satisfactory, for such processes seldom completely remove the impurities in chemical solution in water. In this country, too, they are not likely to be carefully performed, and there will always remain much doubt whether after all they have been effectual.

Extract from a letter dated Lahore, 26*th March* 1862, *from* Dr. T. E. B. Brown, *Chemical Examiner, Lahore, to the President of the Cholera Commission.*

From my investigations I am of opinion that the waters of Meean Meer belong to the class of alkaline water, and contain a considerable quantity of carbonate of soda.

2. That many of the wells form sulphuretted hydrogen if they are not regularly worked, but are free from that gas when emptied frequently.

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I would here observe that in the rains, at which time the Epidemics of Cholera occur, the wells are less worked than at other times of the year.

Lastly, that certain wells in the neighbourhood of the cess-pools are contaminated with sulphuretted hydrogen whether worked or not.

Appended is a summary of analyses.

	Well in Infantry Hospital.	Well in Cook House, Infantry Lines.	Well near Plunge Bath, Infantry Lines.	Well near Billiard Room, Infantry Lines.	Well in Cook House, Artillery Lines.	Well in Sir R. Montgomery's Compound.	Well near Medical College.
Specific Gravity...	1000·4	1000·97	1000·68	1000·63	1001·90	1000·72	1000·63
Chloride of Sodium	4·29	2 96	3·19	2·38	4·31	5·82	22·71
Sulphate of Soda	8·85	9·05	6·45	2·	13·17	9·50	25·95
Sulphate of Lime	...	...	...	...	...	...	4·12
Carbonate of Soda	23·66	19·57	22·70	26·96	45·73	·71	...
Carbonate of Lime	8·94	7·53	7·89	9·53	8·40	12·50	11·25
Carbonate of Magnesia ...	·69	2·96	5·54	8·19	10·01	8·02	4·82
Silica ...	1·91	1·84	2·20	2·26	1·53	·84	3·20
Organic Matter...	3·88	3·88	4·16	5·47	4·11	3·50	1·82
Sulphate of Sodium ...	...	...	...	·43	...	...	...
Total Solids ...	52·22	47·79	5·2	57·22	87·26	40·95	73 87
Sulphuretted Hydrogen ...	None	None	1·26 gr. or 3·52 c. f.	·6 grs. or 1·65 c. f.	None	None	None.
Matter in suspension ...	·605	3·95	2·06	1·01	...	1·13	·62
Organic matter in suspension ...	·174	·09	1·13	·12	...	...	·03

Extract from a Report by DR. BROWN, *Chemical Examiner, Lahore, to Secy. to the Govt. of Punjab, dated* 3rd *May* 1862.

All the wells examined at Meean Meer and in the Central Jail proved to be alkaline, and to contain a quantity of carbonate of soda; this salt is supposed by Chemists to be produced by the action of rain water,

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holding in solution, as it always does, carbonic acid, on a silicate of soda existing in the soil. The resulting carbonate of soda is found to be injurious to vegetation, and it is known that the lands about Meean Meer and the Jail are less productive than those about Anarkullee. In most soils sulphate of lime is contained; this salt re-acts on carbonate of soda when both mingle in solution, and sulphate of soda and carbonate of lime result. But the "reh," or efflorescence on the soil, seen about Meean Meer, is often principally composed of sulphate of soda, while "kunkur," also found in that soil, is principally carbonate of lime. I am therefore inclined to suggest that in some places the "reh" and "kunkur," when these two are found together, may be formed by the mixture of well waters containing carbonate of soda with sulphate of lime. But while suggesting this, it is necessary to remember that reh has not always the same composition. I would further draw attention to the absence of sulphate of lime from those waters which contain carbonate of soda, and its presence in those which do not, as confirmatory, to a certain extent, of the above remarks. Although carbonate of soda connot be considered a substance very dangerous to health, yet it is the opinion of Medical writers that the long continued use of this and other similar salts "disorders the functions of the digestive system and assimilative organs, and gives rise to a kind of dyscracia analogous to scurvy." While officiating recently for a short time as Medical attendant at the Central Jail, Lahore, I found many of the prisoners were suffering from a condition of scurvy, and although it is true that prisoners in most Jails are very liable to this affection, yet no one would advance that fact as a reason for causing them to drink well water likely to produce a similar effect, especially when, as in this case, a purer source of water is available in the canal. The water from this has been examined by Mr. Medlicott at Madhopoor, and by myself at Neaz Beg; at the former place, it contains 7·14 grains of solid matter in a gallon, and at the latter, 8 grains in the same quantity. The slight increase may be accounted for by the loss of water by evaporation, and some little surface drainage. In neither case was any carbonate of soda present. This is therefore much purer than any well water examined, and I would beg to suggest that a Committee should be appointed to determine the advisability of providing the Soldiers at Meean Meer and the convicts in the Jail with canal water for drinking purposes, instead of well water, as at present. The opinions of Military Officers, Medical Officers, the Superintendent of the Jail, and Engineer acquainted with the District, and of a Chemist, would probably be of service in determining this point. I would next call attention to the fact that the organic matter is in larger proportion in the two wells which contain

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sulphuretted hydrogen, viz., those numbered 3 and 4 in the Abstract, than in the rest. The well No. 3 contained more in suspension, No. 4 more in solution. These two wells were both in the neighbourhood of cess-pools (as will be seen in the accompanying Block Plan of the Infantry Lines,) and the sulphuretted hydrogen contained in them was not removed by working the wells as it was in the others.

That this may be a localising cause of Cholera is evident; thus in the Report of the General Board of Health, 1850, it is stated that inhabitants of 30 houses in Hope Street, Salford, used the water of a well into which a sewer leaked, and that 26 people in those houses were attacked with Cholera, and 25 died, while no case of Cholera occurred among the inhabitants of 60 other houses, who did not use that well. Certain of the wells in the Artillery Lines showed evidences of the presence of sulphuretted hydrogen as long as they remained unused, but became perfectly free from that substance as soon as they were worked. This would appear to be owing to putrefaction of organic matter in stagnant water, which is prevented by the bringing up of a fresh supply. The recent Epidemic of Cholera occurred at a time of year, the rainy season, in which wells are not so much worked as at other times, but I am unable to state whether sulphuretted hydrogen was present in certain of the wells at that time, as in those which I examined it was absent both then and afterwards. I would desire to call the attention of Government to the desirability of working wells near a barrack at least once a week, in order to prevent the water becoming stagnant, and thus forming sulphuretted hydrogen. This is especially necessary when a Cantonment has been left vacant for any time, and in the rainy season, as otherwise the water may be left undisturbed for a long period.

With respect to the organic matter found in the water, it will be noticed that it is in much greater proportion in the wells at Meean Meer than in the deep wells of London. This increase is probably caused by the water being so near the surface of the ground that some amount of surface drainage must always pass into them, and the thickness of the soil is not sufficient, or is too saturated with organic matter, so that it does not act as an efficient filter. This increased amount of organic matter is very likely to prove injurious to health, and is an additional reason for substituting the use of the canal water, instead of these superficial wells. If, however, the canal water should prove to be unavailable from any cause, I should recommend that wells should be dug to a much greater depth, so as to reach water which is not likely to be affected by surface drainage; this, however, should be examined before being used.

APPENDIX V.

NOTE.—For the reasons explained in para. 343 of the Report, it has been thought advisable to print the following Meteorological Returns, although for the most part they can only be considered to give a rough approximation to the truth. The rain-fall and direction of the wind at each Station in the North-Western Provinces, for every day, is shown in the Registers published weekly in the Allahabad Government Gazette. These it has not been thought necessary to reprint.

Meteorological Register kept at the Surgeon's House of the 5*th Regiment, late Bengal Cavalry at* MEEAN MEER.

Days of the Month.	At Sun-rise.				At 10 A. M.				At. 4 P. M.				At 10 P. M.				Thermometer in Sun's rays at 4 P. M.	Self-registering Thermometer.		Rain Gauge.
		Temperature Of the Air.	Temperature Of Wet Bulb.	Direction of the Wind.		Temperature Of the Air.	Temperature Of Wet Bulb.	Direction of the Wind.		Temperature Of the Air.	Temperature Of Wet Bulb.	Direction of the Wind.		Temperature Of the Air.	Temperature Of Wet Bulb.	Direction of the Wind.		Maximum.	Minimum.	
1861. Augt.																				In.
1	Clear.	83	80	S. E.	Clear.	101	84	W.	Clear.	103	83	S. W.	Clear.	92	81	N. E.	120	104	82	0
2	Clear.	83	79	S. E.	Clear.	96	78	S.	Cloudy.	104	83	S. E.	Cloudy.	89	79	S. E.	105	104	79	0
3	Rain.	80	79	S. E.	Cloudy.	88	83	S. E.	Cloudy.	95	83	S. E.	Clear.	80	81	S. E.	114	98	83	0
4	Hazy.	84	83	S.	Thin cl.	100	84	S. W.	Cloudy.	98	85	E.	Cloudy.	87	81	S. E.	113	101	84	0
5	Hazy.	84	80	S. E.	Clear.	98	85	E.	Clear.	99	84	N. E.	Cloudy.	91	82	S. E.	110	101	80	0
6	Cloudy.	81	78	S. E.	Cloudy.	88	80	S. E.	Clear.	92	82	N. E.	Clear.	84	80	E.	114	94	80	0
7	Clear.	81	80	E.	Clear.	98	85	N. E.	Clear.	98	83	N.	Clear.	89	82	E.	108	99	82	$\frac{4}{8}$
8	Rain.	83	80	S. W.	Rain.	78	78	N.	Cloudy.	83	82	N.	Clear.	80	80	W.	84	84	78	0
9	Clear.	79	79	W. E.	Clear.	98	90	E.	Cloudy.	95	83	N. E.	Clear.	80	81	S. E.	119	98	82	0
10	Clear.	82	82	W. E.	Cloudy.	92	85	S. E	Storm.	87	81	S. E.	Cloudy.	81	76	S. E.	87	92	74	$1\frac{2}{8}$
11	Rain.	77	76	S. E.	Cloudy.	83	78	S. E	Cloudy.	86	82	N. E.	Clear.	80	76	E.	90	87	76	$\frac{2}{8}$
12	Clear.	77	76	N. E.	Clear.	89	80	W.	Clear.	94	84	S. W.	Clear.	80	76	W.	115	96	78	$\frac{3}{8}$
13	Clear.	78	75	E.	Cloudy.	83	76	E.	Cloudy.	82	76	E.	Storm.	79	75	W.	92	83	75	0
14	Clear.	77	74	S. E.	Clear.	85	79	S. E.	Clear.	88	79	S. E	Clear.	80	79	E.	105	89	77	0
15	Cloudy.	78	77	E.	Cloudy.	87	80	S. E.	Cloudy.	99	81	S. E	Clear.	84	78	E.	110	91	80	0
16	White cl.	81	79	E.	White cl.	90	80	E.	Clear.	93	81	W.	Clear.	89	79	W.	114	95	83	0
17	Clear.	84	80	S. E.	Clear.	94	81	S.	Clear.	98	83	N. W	Clear.	92	83	S.	121	100	85	0
18	Cloudy.	86	82	S. E.	Clear.	89	79	S. E	Cloudy.	96	82	N. E.	Cloudy.	88	82	E.	115	97	83	0
19	Clear.	84	80	S. E.	Cloudy.	94	81	S. E	Cloudy.	94	81	E.	Clear.	86	80	E.	98	95	83	0
20	Cloudy.	85	81	E.	Cloudy.	97	84	E.	Rain.	90	84	N.	Clear.	86	81	E.	110	98	83	$1\frac{4}{8}$
21	Clear.	83	81	E.	Clear.	97	85	S. E.	Cloudy.	79	78	S.	Cloudy.	78	77	E.	79	97	75	0
22	Cloudy.	83	80	E.	Cloudy.	80	77	N. E.	Cloudy.	84	80	N.	Cloudy.	80	78	E.	85	85	77	0
23	Cloudy.	79	77	E.	Cloudy.	86	81	S.	Clear.	91	81	S.	Clear.	83	79	E.	121	93	82	0
24	Cloudy.	82	79	E.	Cloudy.	88	80	E.	Cloudy.	92	80	S. E.	Clear.	85	80	E.	115	94	80	0
25	Cloudy.	81	78	E.	Cloudy.	87	80	N. E.	Cloudy.	92	83	N. E.	Clear.	83	80	N. E.	95	98	80	0
26	Clear.	81	79	E.	Clear.	98	86	N. E.	Clear.	97	87	N. E.	Clear.	82	80	E.	110	99	80	0·2
27	Cloudy.	83	81	E.	Clear.	98	87	N. E.	Cloudy.	93	83	S. E.	Cloudy.	88	78	S. E.	94	104	79	0
28	Cloudy.	77	74	N. E.	Cloudy.	87	79	N. E.	Clear.	91	80	N. W.	Clear.	83	78	N.	99	103	74	·11
29	Clear.	78	76	N. E.	Clear.	98	83	N. E.	Clear.	96	83	W.	Clear.	86	80	...	102	101	77	0
30	Clear.	82	78	S. E.	Cloudy.	76	74	N. E.	Cloudy.	86	79	W.	Clear.	78	76	N. E.	88	98	71	0
31	Cloudy.	75	73	S. E.	Clear.	91	81	N. E.	Clear.	94	80	N. E	Clear.	83	79	N. E.	104	97	73	·818
																				4·823

10th.—Dust storm electrical from S. E.—12th, Storm, heavy black clouds with lightning.

18th.—8½ A. M. Dust storm strongly electrical from S. E.—20th, 1 P. M., heavy shower.

23rd.—A slight shower, 7 A. M.—26th, Shower with lightning.—28th, Slight shower, 1 A. M.

30th.—Heavy storm, thunder and lightning and rain, 7 A. M. to 9 A. M., from N. W. to N. E. and E.

D. McRAE, *Surgeon Major,*
H. M.'s Late 5th B. E. Cavalry.

Meteorological Register,—(continued.)

	At Sun-rise.				At 10 A. M.				At 4 P. M.				At 10 P. M.					Self Registering Thermometer.		
Days of the Month.		Tempera-ture Of the Air.	Tempera-ture Of Wet Bulb.	Direction of the Wind.		Tempera-ture Of the Air.	Tempera-ture Of Wet Bulb.	Direction of the Wind.		Tempera-ture Of the Air.	Tempera-ture Of Wet Bulb.	Direction of the Wind.		Tempera-ture Of the Air.	Tempera-ture Of Wet Bulb.	Direction of the Wind.	Thermometer in Sun's rays at 4 P. M.	Maximum.	Minimum.	Rain Gauge.
1861. Sept.																				In.
1	Clear.	80	77	N. E.	Clear.	94	84	N. E.	Clear.	94	84	N. W.	Clear.	86	81	N. W.	109	105	83	None.
2	,,	81	79	N. E.	,,	94	83	W.	,,	103	86	W.	,,	87	82	N. W.	110	104	79	
3	,,	82	79	N. E.	,,	98	84	W.	,,	102	84	N.	,,	88	83	S. E.	113	108	80	
4	,,	84	79	N. E.	,,	102	86	S. E.	,,	104	83	E.	,,	89	83	N. E	112	106	82	
5	,,	84	80	S.	,,	102	84	S. W.	,,	104	86	S. W.	,,	88	80	N. E.	118	108	84	
6	,,	83	79	S. E.	,,	100	87	W.	,,	104	83	W.	,,	90	82	N. E.	109	107	82	
7	,,	83	79	S. W.	,,	101	85	W.	,,	106	85	S. W.	,,	89	81	S. W	115	107	83	
8	,,	82	79	S. W.	,,	97	84	W.	,,	103	81	S. W.	,,	87	79	N. E.	115	107	82	
9	,,	83	79	S. E.	Cloudy.	96	83	S. E.	Cloudy.	97	82	S. E.	,,	88	81	S. E.	101	104	81	
10	,,	83	78	S. E.	,,	97	83	S. E.	,,	97	82	S. E.	,,	84	77	S. E.	107	99	81	
11	,,	81	78	S. E.	Clear.	96	83	S. E.	,,	96	83	S. W	,,	87	75	S.	106	98	80	
12	,,	80	74	S. W.	,,	95	80	W.	Clear.	96	78	W.	,,	86	74	S. W.	108	98	80	
13	,,	79	74	S. W	,,	92	77	S. W.	,,	96	79	S. W.	,,	84	74	S	102	98	77	
14	,,	79	72	S. W.	,,	91	76	S. W.	Cloudy.	95	78	S.	,,	93	73	S.	100	96	77	
15	,,	78	70	E.	,,	96	80	S. W.	Clear.	95	78	W.	,,	92	71	S.	113	96	76	
16	,,	74	70	S. W.	,,	92	75	W.	,,	94	76	N. W.	,,	93	73	S.	103	96	74	
17	,,	77	71	S. E.	,,	94	77	S. W.	,,	96	78	N.	,,	94	74	N.	104	97	76	
18	,,	75	71	S. W.	,,	96	76	N. W.	,,	93	75	N. W.	,,	86	71	S.	107	95	75	
19	,,	76	69	S.	,,	97	77	S. W	,,	98	76	S.	,,	84	70	S.	113	100	76	
20	,,	74	68	S.	,,	96	75	N, W.	,,	99	73	S. W.	,,	84	70	W.	107	100	74	
21	Cloudy.	75	68	S.	Cloudy.	90	73	W.	Cloudy.	92	75	S.	,,	80	69	S.	98	95	75	
22	Clear.	77	68	N. W.	Clear.	89	73	N.	,,	95	79	N. W.	,,	84	71	W.	100	96	75	
23	,,	74	64	N. W.	,,	92	73	N. W	,,	94	74	N. W.	,,	82	70	W	98	96	72	
24	,,	74	67	N. W.	,,	91	72	N. W.	Clear.	96	72	N. W	,,	81	69	W.	103	97	72	
25	,,	72	64	W.	,,	92	71	W	,,	95	71	N W.	,,	81	70	W.	112	97	71	
26	,,	71	62	E.	,,	95	73	E.	,,	95	73	N. E	,,	80	70	N.	117	97	69	
27	,,	72	65	S. E.	,,	95	76	W.	,,	95	75	S.	,,	84	69	S.	120	100	71	
28	Cloudy.	77	70	E.	Cloudy.	97	81	S. E.	Dust Sto.	90	75	N.	,,	77	69	N.	112	100	75	
29	,,	72	65	N.	Clear.	86	70	N. E.	Cloudy.	91	73	N E.	,,	79	68	S. E.	98	93	71	
30	Clear.	66	63	N. W.	,,	88	70	W.	Clear.	93	70	N. W	,,	79	66	N.	100	94	66	

D. McRAE,
Surgeon Major.

Meteorological Register kept inside the Hospital and Barracks of the Left Wing, 94th Regiment, AMRITSUR.

Date.	Temperature.				Direction of Wind.	Observations on the Weather.
	Sun-rise.	10 A. M.	2 P. M.	Sun-set.		
1861.						
August.						
1	85	88	91	93	W.	
2	83	87	91½	94	E.	Rain at 2¼ A. M.
3	81	84	87	87	E.	Rain at 2 A. M.
4	84	87	89	88	S. E.	
5	83½	87	90	84	E.	
6	81	81	84	85½	E.	
7	83	85	88	87	W.	
8	84½	82½	85	88½	E.	Rain at 10 A. M.
9	82	85	87	87½	W.	
10	84½	84½	85	87	E.	
11	81½	82½	83	84	E.	
12	81	83½	86½	87½	W.	
13	81	81	83	82	E.	Rain at 4¼ A. M., sand storm at 7 A. M.
14	72½	80	84	83	E.	
15	79	82½	84½	83	E.	
16	81½	84½	88	85	W.	
17	84	88	89	90	N. W.	
18	85	81	87	88	E.	Sand storm at 7¼ A. M., Rain at 8¼ A. M
19	83	84	88½	88	E.	
20	83	88	88½	88	E.	
21	84½	87½	81½	82	E.	Rain at 11 A. M. very heavy.
22	81	83½	81	82½	E.	Rain at 11¼ A. M.
23	82	84	86	87½	S. E.	
24	82½	88	87	86	E.	
25	82	85	85	85	E.	
26	82	84	85½	90	E.	
27	83	91	88	87	E.	
28	78	78	84	84	S.	Rain at 9½ A.M.
29	80	84	85½	87	W.	
30	83	83	80	81	N.	Rain at 8¼ A. M.
31	72	78	82	80	E.	Rain at 4 A. M.

Maximum	......	94
Medium	......	85
Minimum	......	72

(Sd.) E. G. MACGRATH,
Asst. Surgeon.

GSL

Meteorological Register kept inside the Hospital of the Left Wing, 94th Regiment, AMRITSUR.

Date.	Temperature.					Observations on the Weather.
	Sun-rise.	10 A. M.	2 P. M.	Sun-set.	Wind.	
1861.						
September.						
1	80	84	86	86	E.	
2	82	85	88	88	E.	
3	82	88	90	87	E.	
4	83½	88	92	90	W.	
5	85	89	91	91	S. W.	
6	84½	88	91	90	E.	
7	82	84	93	90	W.	
8	84	86	90	89	E.	
9	83	84	89	90	S. E.	
10	83	85	88	90	W.	
11	82	85	87	89	E.	
12	84	86	90	92	E.	
13	84	87	89	91	S. E.	
14	83	86	88	90	E.	
15	82	84	81	87	E.	A slight sand and thunder-storm at 3½ P. M.
16	80	86	90	88	S. E.	
17	81	87	90	89	E.	
18	83	86½	91	94	W.	
19	85	88	94	90	S.	In tents on the march.
20	86	87	90	89	S. E.	A slight sand-storm at 9 A. M.
21	86	89	90	92	S.	
22	85	88	89	91	W.	
23	87	88	97	95	S.	
24	70	90	101	94	S.	
25	69	93	104	93	S.	
26	68	95	101	89	S.	
27	69	93	100	86	S. E.	A slight shower at 3½ A. M.
28	76	94	98	85	W.	Thunder and rain at 1½ P. M.
29	73	84	90	86	S. E.	Thunder and rain at 12½ A. M.
30	68	87	94	90	W.	

Maximum 104
Medium 86
Minimum 68

(Sd.) E. G. MACGRATH,

Asst. Surgeon.

Meteorological Register kept at the Charitable Dispensary at Umballa.

Month.	Dates.	THERMOMETER.			Direction of Wind.	FALL OF RAIN IN INCHES.	
		Maximum.	Medium.	Minimum.		Inches.	Tenths.
August 1861 ...	1	102	91	80	W.	0	0
	2	100	89	79	E.	0	0
	3	99	88	78	E.	2	9
	4	98	88	78	E.	0	1
	5	100	90	80	E.	0	0
	6	94	84	74	E.	0	7
	7	98	88	78	E.	0	0
	8	100	91	82	E.	0	0
	9	102	88	77	E.	0	0
	10	79	77	75	E.	1	7
	11	96	85	75	W.	0	0
	12	104	91	78	W.	0	0
	13	78	77	77	E.	0	2
	14	89	82	75	E.	0	9½
	15	97	87	77	E.	0	0
	16	102	88	76	E.	0	0
	17	100	88	79	E.	0	0
	18	94	88	78	E.	0	0
	19	98	89	80	E.	0	0
	20	103	91	80	E.	0	0
	21	91	85	79	E.	1	9
	22	102	90	79	E.	0	0
	23	98	88	78	E.	0	0
	24	94	86	79	E.	0	0
	25	94	85	77	E.	0	0
	26	102	90	78	E.	0	0
	27	80	79	79	E.	3	3
	28	102	88	75	E.	0	0
	29	96	85	75	E.	0	0
	30	92	85	78	E.	0	0
	31	91	83	76	E.	0	0

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Meteorological Register at Umballa,—continued.

Month.	Dates.	TEMPERATURE.			Direction of Wind.	FALL OF RAIN IN INCHES.	
		Maximum.	Medium.	Minimum.		Inches.	Tenths.
September 1861	1	96	87	76	E.	0	0
	2	98	89	81	E.	0	0
	3	105	88	72	W.	0	0
	4	106	90	75	W.	0	0
	5	97	88	80	E.	0	0
	6	105	92	79	E.	0	0
	7	108	92	76	E.	0	0
	8	82	81	80	E.	0	0
	9	97	88	79	E.	0	3
	10	83	80	77	E.	0	0
	11	94	84	74	E.	0	1
	12	93	83	74	W.	0	1
	13	94	85	77	W.	0	0
	14	93	83	73	W.	0	0
	15	95	84	74	W.	0	0
	16	97	85	74	W.	0	0
	17	95	83	71	W.	0	0
	18	97	85	74	W.	0	0
	19	102	86	71	W.	0	0
	20	106	90	74	E.	0	0
	21	97	84	72	W.	0	0
	22	107	88	69	W.	0	0
	23	105	91	76	W.	0	0
	24	103	86	70	W.	0	0
	25	100	83	66	W.	0	0
	26	94	77	61	W.	0	0
	27	104	87	70	E.	0	0
	28	99	92	75	E.	0	0
	29	100	87	75	W.	0	0
	30	105	84	63	E.	0	0

BHOOBUN MOHUN MITTER,
Sub-Assistant Surgeon.

Meteorological Register kept at Meerut for the months of June, July, and August 1861.

JUNE.

Date.	Thermometer. Maximum.	Thermometer. Medium.	Thermometer. Minimum.	Rain Gauge.	Wind.	Remarks on the Weather.
1	83	78	75	1·1	N. E.	Thick fleeting clouds.
2	88	77	76	...	N.	Frequent showers, thunder and lightning.
3	87	81	77	...	N. E.	Clear, gentle wind.
4	89	83	81	...	N. E.	Ditto, ditto.
5	87	86	82	...	N. E.	Ditto, strong gusts of wind.
6	89	87	85	...	W. W.	Cloudy, strong wind, dusty.
7	90	87	87	...	N. W.	Dusty, strong wind, light showers.
8	92	90	85	...	N. W.	Clear, windy.
9	91	88	87	...	N. W.	Ditto, occasionally strong wind.
10	93	90	85	...	N. W.	Ditto ditto.
11	92	91	90	...	N. W.	Ditto ditto.
12	92	87	84	...	N. W.	Cloudy, gentle breeze.
13	92	90	88	...	N. W.	Clear, strong breeze.
14	90	89	89	...	N. W.	Ditto, ditto ditto.
15	93	88	85	...	N. E	Strong breeze, dusty.
16	94	88	86	...	S. E.	Clear, strong breeze.
17	86	83	80	·5	E.	Cloudy, showery, morning and night.
18	85	81	78	·4	E.	Cloudy rainy morning, clear toward evening.
19	85	82	81	·3	E.	Cloudy and rainy.
20	86	82	82	3·4	E.	Ditto slight showers at morning, stormy at midnight, lightning violent and rain.
21	81	80	78	2·4	E.	Rain, gusts of wind.
22	83	82	79	·6	E.	Ditto ditto.
23	87	85	80	·7	E.	Cloudy, light rain at midnight.
24	84	79	78	·2	E.	Slight showers, gentle wind.
25	85	85	77	...	E.	Cloudy, gentle wind.
26	87	84	81	...	E.	Ditto ditto.
27	86	82	79	...	E.	Ditto ditto.
28	87	82	78	·5	E.	Ditto, rain, gentle wind.
29	91	85	80	...	E.	Ditto, gentle wind.
30	90	83	79	...	E.	Cloudy.
			Total...	10·1		

JULY.

Date.	Thermometer. Maximum.	Thermometer. Medium.	Thermometer. Minimum.	Rain Gauge.	Wind.	Remarks on the Weather.
1	81	79	76	1·1	E.	Rain, thunder and lightning.
2	80	80	78	1·2	E.	Rain, gentle wind.
3	82	80	78	...	E.	Cloudy, ditto.
4	87	83	80	...	E.	Fleeting clouds, gentle wind.
5	85	83	81	...	E.	Cloudy, with thunder.
6	86	82	79	·7	E.	Rain storm 4 P. M.
7	86	82	78	...	E.	Cloudy, gentle breeze.
8	89	85	81	...	E.	Stormy at 4 P. M.
9	87	85	80	...	E.	Fleeting clouds, gentle winds.
10	88	82	80	·1	E.	Slight rain, ditto.
11	89	84	81	...	E.	Fleeting clouds, ditto.
12	86	85	80	...	E.	Cloudy, ditto.
13	83	82	80	...	E.	Ditto, slight showers.
14	87	84	81	...	E.	Ditto.
15	86	83	80	...	E.	Ditto.
16	82	81	83	2·4	E.	Ditto and rain.
17	82	80	80	1	E.	Ditto ditto.
18	82	80	79	2·1	S. E.	Slight rain, cloudy.
19	84	83	80	...	E.	Cloudy.
20	83	82	79	2·2	S. E.	Rain.
21	82	79	78	1·3	S. E.	Ditto and cloudy.
22	82	81	78	·4	S. E.	Cloudy, rain at night.
23	87	82	79	·6	S. E.	Ditto, rain in the morning.
24	86	83	81	...	S. E.	Ditto.
25	84	82	81	...	S. E.	Ditto.
26	87	84	80	6·2	E.	Ditto, heavy rain at night, very cloudy.
27	85	84	80	...	W.	Cloudy.
28	89	85	81	...	W.	Ditto.
29	89	84	81	...	S. W.	Clear.
30	89	86	81	...	S. W.	Ditto.
31	87	86	81	...	S. W.	Morning cloudy.
			Total...	17·8		

AUGUST.

Date.	Thermometer. Maximum.	Thermometer. Medium.	Thermometer. Minimum.	Rain Guage.	Wind.	Remarks on the Weather.
1	88	86	83	...	S. W.	Cloudy and damp, gentle breeze.
2	89	84	82	...	S. E.	Ditto ditto, ditto.
3	87	85	82	·6	S. E.	Rain.
4	85	85	82	...	S. E.	Cloudy.
5	83	83	81	·3	S. E.	Rain.
6	86	82	79	...	S. E.	Cloudy.
7	85	82	81	...	S. E.	Ditto.
8	90	86	83	...	S. E.	Ditto.
9	88	85	84	...	S. E.	Ditto and sultry.
10	83	82	81	·5	S. E.	Rain in the morning.
11	86	85	81	...	S. E.	Rain.
12	86	86	83	·6	S. E.	Ditto.
13	84	82	80	1·3	S. E.	Ditto and thunder.
14	81	79	78	·5	W.	Rain.
15	88	82	78	...	N. W.	Cloudy.
16	88	85	81	...	S. E.	Ditto.
17	87	85	84	...	E.	Ditto.
18	89	85	81	...	E.	Fleeting clouds.
19	91	86	81	...	S. E.	Ditto.
20	92	86	82	...	S. E.	Ditto.
21	91	85	82	...	E.	Cloudy.
22	89	86	86	·3	E.	Rain.
23	86	85	85	...	E.	Fleeting clouds.
24	89	85	80	...	S. E.	Ditto.
25	86	84	80	...	E.	Ditto.
26	89	86	81	...	S. E.	Ditto.
27	84	82	81	...	S. E.	Ditto.
28	86	82	80	1·6	S. E.	Heavy rain.
29	89	85	80	1·4	E.	Rain and thunder.
30	85	84	79	...	E.	Cloudy.
31	83	82	78	...	E.	Ditto.
			Total...	7·1		

Comparative Abstract of the Meteorological Register for the months of July, August, and September 1860 *and* 1861, *kept at the Agra Central Prison.*

From Daily observations taken at 9 A. M. and 3 P. M.	July.		August.		September.	
	1860.	1861.	1860.	1861.	1860.	1861.
Adopted mean temperature of air for each month ...	90·2	82·6	84·6	84·5	88 6	85·5
Mean temperature of evaporation for each month ...	78·7	80·8	77·7	79·1	75·6	75·9
Mean Maximum temperature of air	101·6	92·8	94·6	95·2	100	9·4
Mean Minimum temperature of air	82·2	74·0	77·4	77·6	76·5	75·0
Mean daily range of temperature	19·4	24	17·2	17·6	23·6	20·4
Maximum temperature of air during the month ...	118	97	105	102	106	102
Minimum ditto ditto ditto ...	75	73	73	74	73	72
Extreme range of temperature ditto ditto ...	43	18·8	32°	28	33	30
Quantity of rain in each month	8·93 inches from15th	11·33 inches	2·19 inches	5·96 inches	1·26 inches	1·83 inches
Wind. Direction.	Number of days from each point.					
At 9 A. M. ... ... N.	2	3	3	3	7	5
N. E.	0	0	1	0	4	1
E.	12	8	10	3	4	5
S. E.	1	1	1	3	2	0
S.	0	2	0	2	0	0
S. W.	2	0	0	1	0	0
W.	8	0	3	1	0	11
N. W.	0	5	9	1	5	1
At 3 P. M. ... ... N.	1	2	1	2	9	7
N. E.	0	1	1	0	5	1
E.	11	1	11	7	5	2
S. E.	0	4	0	4	0	0
S.	0	2	0	1	0	0
S. W.	0	0	0	0	0	0
W.	1	1	2	0	1	12
N. W.	3	3	12	2	2	1
Mean amount of cloud from 0 sky quite clear, 10 sky quite overcast.	2·4	5·6	6·4	5·3	3·5	3
Mean amount of ozone (Schonbein)	1·4	3·2	1·1	1·9	1·1	·3
Thunder storms on	...	on 1st & 2nd	...	on 5th	on 7th & 8th	
Thunder heard without lightning being seen	5th 6th 17th 28th 29th 30th	...	4th and 17th			
Lightning seen without thunder being heard	21st	...	...	on 8th, 11th and 12th	4th, 17th, 19th, 21st.	
Dust storms occurred on	2nd and 12th	...	...	...	6th 17th, 29th, and 30th.	

W. WALKER, M. D.,

Superintendent, Central Prison.

Comparative Meteorological Register for the months of July 1860 *and* 1861. *Agra Central Prison.*

Date of Month.	Observations taken at 9 *h.* A. M. local time.								Observations taken at 3 *h.* P. M. local time.								Observations taken at 9 *h.* A. M. local time.							
	Dry Bulb Thermometer.		Wet Bulb Thermometer.		Direction and force of Wind.		Amount of Cloud.		Dry Bulb Thermometer.		Wet Bulb Thermometer.		Direction and force of Wind.		Amount of Cloud.		Maximum temperature in Air.		Minimum temperature in Air.		Amount of Ozone.		Amount of Rain.	
	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.	1860.	161.	1860.	1861.
1	100	81	79	78	0	S. 1	8 k.	10 k.	110·5	90	77	81	0	S. 1	6 k.	3 k	116	94	86·5	76	1	8	...	8 4
2	98	84	80	84	E. 1	S. 1	10 k. c.	6 k.	94	82·5	77	79 5	E. 2	0	10 k.	9 k.	108	93	91·5	78	0	8		
3	94	80	81 5	77	E. 1	0	3 k.	9 k.	101	90	79	82	E. 1	0	0	8 k.	116	94	80·5	76	4	7	..	0 10
4	87·8	87	79	82	N. 1	0	9 k. s	5 k.	99	90	80 5	83	E. 2	0	5 c.	5 k.	112	95	79·8	80	4	4		
5	91·5	81	82	79	E. 1	0	6 k. s	10 k.	88	91	80·5	83	E. 2	0	10 c.	6 k.	104	96	82·8	78	5	6	...	0·55
6	93	88	82	82	0	N. 1	10 k.*	5 k.*	92	94	80	84	0	0	10 c.	3 k.	101·5	97	81	77·5	5	3		
7	95	77	78	74·5	W. 4	0	2 k.	10 k.*	112	92	80	85	W. 2	0	0	6 k.	114	94	85	73	1	6	..	3·5
8	97	82	78	78	W. 3	0	0	5 k.	112	90	79	83	W. 2	0	4 k.c.	3 k.	113·8	95	90	73	0	5		
9	96	85	78	81	W. 3	0	3 k.	8 k.	108	90	80	84	W. 2	0	0	8 k.	112	93	89	78	0	5		
10	98	81	79	79	W. 3	0	0	10 k.	110	82	77·5	78	W. 3	W. 1	0	8 k.	113	95	89	78	1	6	...	0·5
11	96	84	76·5	81	W. 3	N. W. 1	3 k. s.	9 k.	106	87	78	83	W. 2	0	4 c.	5 k.	110	90	87	77	0	3	...	0·4
12	96	87	77	82	W. 3	0	0	8 k.	110·5	85	74	83	W. 2	0	1 s.	10 k.	114	84	88	80	0	2		
13	98·5	83	76	80	W. 2	E. 1	0	8 k.	113	81	75	79	W. 2	0	2 c.	10 k.	118	90	86	77	0	4	...	1·
14	101	85	77	81	N. 2	E. 1	0	6 k.	113	88	77·5	79	N. 1	0	0	3 k.	115	94	86	78·5	0	5	...	0·5
15	97	93	82	83	E. 2	E. 1	3 k.	5 k.	107	95	81	80	E. 1	0	3 c.	3 k.	111	95	89·5	77	0	2	·3	
16	94	89	79	82	E. 1	E. 1	10 k.	6 k.	89	87·5	81	86	E. 1	0	10 k.	5 k.	99·8	96	82·8	75	3	2	·33	1·02
17	85	84	79	81	0	E. 1	10 k.	9 k.	90	83	79	82	E. 1	0	10 k.	8 k.	94	90	78	79	1	1	...	0·1
18	82·5	86	77	81	W. 1	0	10 k.	5 k.	90·5	88	80	81	W. 1	0	6 k.s.	3 k.	93·5	93	77·8	78	3	1	..	·25
19	83·5	89	80	81	0	E. 1	10 k.	9 k.	92	91	82	81	E. 1	N. E. 1	8 k.s.	2 k.	95	96	77 8	78	5	1	2 1	
20	86·5	84	82	80	E. 1	E. 1	7 c. k.	9 k.	93·5	85	83	81	E. 1	S. 1	10 k.s.	8 k.	95	93	80	79	1	3	·33	
21	89	83	83	79	0	N. 1	4 c.	9 k.	92	85	83	80	E. 1	S. E. 1	10 k.	10 k.	98·5	90	79·5	77	1	2	·33	·3
22	81	85	79	80	E. 1	0	10 k.	8 k.	85	88	85	80	0	E. 1	10 n.k.	5 k.	91	99	77·5	77	2	1	·35	
23	85	85	79 5	80	E. 1	S. E. 1	10 k.	8 k.	92	90	81 5	81	E. 1	S. E. 1	8 k.s.	3 k.	99	94	75	79	2	2	·3	
24	80·2	87	79	81	0	E. 1	10 k.	6 k.	87	84	80	80	E. 1	S. E. 1	10 k.s	1 k.	87	94	79	79	2	4	·3	·12
25	86·5	80 5	80	82	E. 1	0	8 c. k	5 k.	85	92	80	81	N.W.3	0	8 k.n.	5 k.	92	97	76	78	2	2	2·35	
26	82·5	85	79	81	E. 1	0	10 k. s.	8 k.	87·5	82	82	80	E. 1	S. E. 1	10 k.	9 k.	92	90	98·5	79	0	5	·37	
27	85	83	79·5	80	S. E. 1	N. 1	8 k. c.	7 k.	88	89·5	80	78·5	E. 0	N. 1	5 k.n.	10 k.	91	90	79	77	0	1	...	67
28	83	85	80	79	E. 2	N. W. 1	8 k.	5 c.	87	91	81	83	E. 2	N. 1	10 k.s.	5 k.s.	90	93	78·5	75	1	1	1·1	1·92
29	82	89	79	79	E. 2	N. W. 2	8 c. k.	4 c.	82·5	90	81	80	0 N.	N W. 1	8 k.s.	5 k.	86	93	79	75	1	2	·04	
30	82	86	80	79	S. W. 1	S. W. 1	10 k.	2 c.	88	92	84	82	E. 1	N. W. 1	10 k.s.	2 k.	90	95	79	76	1	2	·53	
31	86	85	81	77	N. W. 2	N. W, 2	8 k, s.	2 c.	92	91	81	80	E. 1	N. W. 2	5 k.	2 k.	94	94	80	76	0	2	·2	

* Rainy.

W. WALKER, M. D.,
Superintendent, Central Prison.

Comparative Meteorological Register for the months of August 1860 *and* 1861. *Agra Central Prison.*

Date of Month.	Observations taken at 9 *h.* A. M. local time.								Observations taken at 3 *h.* P. M. local time.								Observations taken at 9 *h.* A. M. local time.							
	Dry Bulb Thermometer.		Wet Bulb Thermometer.		Direction and force of Wind.		Amount of Cloud.		Dry Bulb Thermometer.		Wet Bulb Thermometer.		Direction and force of Wind.		Amount of Cloud.		Maximum temperature in Air.		Minimum temperature in Air.		Amount of Ozone.		Amount of Rain.	
	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.
1	88	87	81·5	82	E. 1	N. W. 2	5 c. k.	3 c.	92·2	93	80·5	82	E. 2	N. W. 1	4 k.	3 k.	96·2	97	80·5	76	1	1		
2	88	91	82	82	E. 1	0	10 k.	3 k.	94	88	83	80	E. 1	E. 1	5 s.	7 k.	95	96	78	80	0	2	·08	
3	86	85	80	80	E. 1	0	8 k. s	10 k.	97·5	85	81	83	E. 1	0	10 k.	3 k.	95	100	76	79	0	2	·16	
4	89·5	90	81·5	83	E. 1	0	6 k. s.	3 k.	90	84	82	80	0	0	10 k.	10 k.	95	102	79·5	78	2	0		
5	87	86	80	80	E. 2	0	8 s. c.	8 k.	91	80	81	78	E. 3	0	5 k. s.	10 k.	93	95	79	76	2	2	·16	1·65
6	89	85	81·5	80	E. 2	E. 1	10 k.	5 k.	96	84	81	80	E. 2	E. 2	10 k.	9 k.	98	93	79·5	76	2	4	...	·12
7	87	85	80	80	E. 2	0	10 k. s.	5 k.	91	90	81	80	E. 2	S. B. 1	10 k.	4 k.	96·5	93	82	76	3	4		
8	86	86	78·5	81	E. 2	S. E. 1	3 k.	5 k.	95·2	94	79	83	E 2	0	8 k.	3 k.	97	98	80	77	3	3		
9	85	89	78·8	81	N. E. 2	N. 1	10 k.	3 k.	94	94	79	81	N. E. 2	N. 1	3 s.	3 k.	96	98	79·2	78	4	5		
10	88	86	79·5	81	E. 1	S. 1	6 k.	7 k.	96·5	83	81	80	0	N. 1	4 k.	9 k.	99	90	77·5	81	0	5		
11	88·5	86	81	82	N. 1	0	8 k. s.	3 k.	96·5	92	83	81	W. 1	E. 1	8 c.	6 k.	98·5	97	82	78	0	3	...	·62
12	82	88	79	84	N. 1	0	10 k.	10 k.	89·8	93	81	81	N. W. 1	0	10 k.	4 k.	94	97	77·8	79	0	1	1·3	
13	86	90	79	83	N. 1	0	10 k.	3 k.	91·5	77	81	76	0	0	10 k.	10 k.	94	97	77·5	79	0	2		
14	83	81	79·5	78	0	0	10 k.	9 k.	87	78	81	76	0	E. 1	10 k.	10 k.	90	88	79	79	0	5	...	·84
15	89·5	85	79·5	80	0	N. 1	10 k.	3 k.	80	88	78	81	E. 1	0	10 k.	5 c. k.	85	93	77·2	74	0	5	·56	
16	81	88	79	82	E. 1	0	10 k.	2 k.	86	93	81	83	N. 1	0	8 k.	4 c. k.	88	99	78	74	0	5	·08	
17	84·5	94	80	84	0	0	8 k.	2 k.	90	87	82	83	E. 1	0	6 k. s.	10 s. k.	94	101	78	81	0	5	*	
18	83	88	80	81	0	S. 1	10 k.	20 k.	81	88	78·5	81	E. 2	0	10 k.	6 c. k.	98	99	79	79	0	3		
19	84	88	80	80	S. E. 1	W. 1	8 k.	4 c. k.	86	95	80	81	E. 1	S. 1	10 k.	5 c. k.	87	99	78·8	79	1	3	·12	
20	78	91	78	81	W. 1	S. E. 1	10 k.	4 c. k.	85	94	81	82	N. W. 1	E. 2	8 k. s.	4 k.	85	100	75·2	81	1	1	*	
21	82	90	77	82	N. W. 2	S. E. 1	10 k.	4 c. k.	85	95	78	80	N. W. 2	E. 2	10 k.	3 k.	87	100	77	81	1	1		
22	83·5	85	76·5	78	N. W. 2	E. 2	10 c.	9 k.	87	90	79	78	N. W. 1	E. 2	10 c. k.	6 k.	90	96	76	80	1	5		
23	85	80	77	75	N. W. 2	E. 3	8 c.	9 k.	89	87	79	78	N. W. 1	S. E. 3	8 c. s.	7 k.	92·5	90	76·2	77	1	6		
24	86	85	77	78	N. W. 2	S. W. 2	2 c.	5 k.	89·5	90	76	79	N. W. 1	S. E. 3	6 c. k.	5 k.	93·5	97	74·8	77	3	5		
25	87	86	77	80	W. 1	0	0	6 k.	88	90	76·5	79	W. N. W. 2	0	8 c. k.	5 c. s.	90	93	75	78	1	5		
26	87	84	76	80	N. W. 2	0	0	7 k.	94	90	77	81	N. W. 2	S. E. 1	5 c. k.	8 k.	96	98	73	78	2	0		
27	88	82	77	77	N. W. 2	N. 1	0	9 k.	96	87	76	80	N. W. 1	N. W. 1	0	5 k.	99	93	74	80·5	2	1		
28	89·5	78	76	77	N. W. 2	0	8 k.	10 k.	98	89	78	82	N. W. 1	0	2 c.	3 k.	100·5	94	76·5	76	2	1	...	·25
29	92	84	77	81	N. W. 1	0	0	8 k.	99	96	78	76	W. N. W. 1	0	4 c.	9 k.	102	92	76	77·5	2	0	...	·25
30	91	93	77·5	81	N. W. 1	0	8 c. k.	9 k.	99	79	79	78	W. 1	0	0	10 k.	101·5	88	78·5	75	1	1	...	2·02
31	92	78	77	77	N. W. 1	0	3 c.	10 k.	101	82	77	79	N. W. 1	0	4 k.	5 k.	105	89	78·8	75	2	1	...	·31

* A slight drizzle all day.

W. WALKER, M. D.,
Superintendent, Central Prison.

CSL

Comparative Meteorological Register for the months of September 1860 *and* 1861. *Agra Central Prison.*

Date of Month.	Observations taken at 9 *h.* A. M. local time.								Observations taken at 3 *h.* P. M. local time.								Observations taken at 9 *h.* A. M. local time.							
	Dry Bulb Thermometer.		Wet Bulb Thermometer.		Direction and force of Wind.		Amount of Cloud.		Dry Bulb Thermometer.		Wet Bulb Thermometer.		Direction and force of Wind.		Amount of Cloud.		Maximum temperature in Air.		Minimum temperature in Air.		Amount of Ozone.		Amount of Rain.	
	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.
1	92	82	78	80	N. W. 1	0	0	10 k.	101	96	77	83	N. W. 1	0	2 k.	2 k.	105	92	88	75	2	·5	...	·75
2	94	80	79	83	N. 1	0	0	2 k.	103	93·5	77	84	0	N. 1	3 k.	3 k.	106	97	78·5	75	2	0		
3	91	88	77	81	N. W. 1	N. E. 1	0	4 k.	101	86	78	81	N. W. 1	N. E. 1	0	6 k.	103	97	77	80	1	1		
4	94	83	79	77	N. E. 1	E. 1	0	4 k.	102	89	77	79	N. E. 1	E. 1	2 k.	8 k.	105	92	77	75	0	2		
5	92·5	82	81	80	0	E. 1	0	7 k.	99	94	79	82	N. E. 1	N. 1	3 k.	6 k.	102	96	81	76	0	·5		
6	92	90	82	82	N. E. 1	0	0	3 k.	98·5	94	80	84	N. E. 1	0	8 k.	3 k.	105	98	80	76	3	0		
7	84	88	80	81	0	0	10 k. s.	4 k.	96	85	82	79	N. 1	N. 1	6 k. c.	10 k.	98·5	97	76	80	2	0	·14	
8	85·5	77	79	77	0	N. 1	8 s. c.	10 k.	94	77	81	76	0	N. 1	6 k. s.	10 k.	98	80	76	77	3	1	·07	·55
9	84	81	78	78	E. 1	N. 1	6 k.	10 k.	88	82·5	78	77	E. 2	N. 2	4 k.	10 k.	91	85	76·5	75·5	3	1	·97	·45
10	84	78	78	75·5	N. E. 1	N. 1	6 c. k.	10 k.	91	80	80	77	N. E. 1	N. 2	5 k.	10 k.	94	87	76	75·5	2	1		
11	83	82	78	78	E. 1	N. 1	10 k.	9 k.	85	85	78	79	E. 1	N. W. 2	10 k.	9 k.	90	88	76	76	0	1	...	·03
12	83·5	87	78	81	0	W. 1	10 k.	2 c. k.	87	90	79	80	N. E. 1	W. 1	10 k. c.	0	90	94	77	75	0	·5	...	·05
13	87·5	86	81	77	S. E. 1	W. 1	10 k.	2 c.	92	91	80	80	0	W. 1	10 k.	3 k.	95	95	75	75	1	·5		
14	88	85	81	76	0	W. 1	10 c.	0	94	91	81	80	0	W. 1	10 k. c.	4 k.	95	95	78	74	0	0		
15	91	86	78	77	N. W. 1	W. 1	5 k.	0	102·5	90	78·5	74	N. 1	W. 1	8 k.	3 k. s.	105	95	79·5	72	1	0		
16	91	86	77	76	N. W. 1	W. 1	0	0	102	90	79·5	81	N. 1	W. 1	3 k.	2 k. s.	103·8	97	77	72	0	0		
17	88	90	76	77	N. W. 1	W. 1	0	0	96	92	79	78	0	W. 1	8 k.	1 s.	102	98	76·5	72	1	0		
18	81·5	80	78	78	0	N. W. 1	8 k. c.	3 k.	93	94	79	78	0	W. 1	3 c.	2 k.	96	99	76·5	75	1	0		
19	84	90	75	78	N. 2	W. 1	5 k.	0	93·5	96	79	78	0	0	3 c.	2 k. s.	96	100	74·5	74	3	0		
20	83	91	76	79	N. E. 1	W. 1	0	0	95·5	95	78	80	N. 1	0	4 c.	0	98	100	74·8	75	0	0		
21	86	89	77	78	N, 2	0	4 c.	0	97	94	79	77	N. 1	W. 1	6 k.	0	100	99	75·5	73·5	2	0	·08	
22	89	88	78	78	N. 1	W. 1	3 k.	0	99	94·5	78	77	N. 1	N. 1	5 k.	2 c.	101	101	76	74	0	0		
23	91	88	78	80	N. 1	E. 1	6 k.	0	100	80	78	78	W. 1	0	3 k.	8 k.	104	97	76	77	0	0		
24	93·5	78	76	74	N. 1	E. 1	2 c.	10 k.	99	81	74	76	N. 1	E. 1	3 k	9 k.	103	85	77	76	0	0		
25	92·5	88	76	81	N. 2	0	0	2 c.	100	95	73	76	N. 1	W. 1	4 k.	0	104	99	74	74	0	0		
26	92	89	73	86	N. 1	W. 1	0	0	101	93	75	76	N. 1	W. 1	2 k.	0	105	102	73	73·5	0	0		
27	91	90	77	78	0	W. 1	0	0	99	96	76	79	E. 2	W. 1	4 k.	0	104	100	73	73	0	0		
28	90	87	78	78	E. 1	E. 1	4 c.	1 c.	98	94	77	81	E. 2	W. 1	4 k. c.	0	102	102	74	76	3	·5		
29	90	89	77	80	S. E. 1	0	4 c.	0	97	93	78	78	E. 1	0	5 k. c.	3 s.	99·5	97	76	75	4	·5		
30	85·5	88	77	79	E. 1	0	0	2 c. k.	96·5	93	76	77	0	0	7 k. c.	3 s.	102	99	74	74	1	0		

W. WALKER, M. .D,

Superintendent, Central Prison.

Copy of a Register of the Thermometer kept at the Jail at Futtehgurh during the months of July and August 1861.

Date.	6 A. M. in Shade.	10 A. M. in Shade.	4 P. M. in Shade.	10 P. M. in Shade.	4 P. M. in Sun's rays.	Direction of Wind.	REMARKS.
1861.							
July ... 1	80	81	83	82	Clouds	E.	Cloudy, slight rain.
2	82	83	85	83	117	E.	Cloudy at times.
3	82	83	82	82	Clouds	E.	Cloudy, slight rain.
4	83	84	84	84	„	E.	Cloudy.
5	84	84	82	83	„	W.	Cloudy, slight rain.
6	82	83	84	84	115	E.	Slight rain.
7	82	82	83	82	Clouds	E.	Cloudy.
8	81	82	82	81	Clouds	W.	Cloudy, slight rain.
9	81	82	83	81	„	E.	Cloudy, rain.
10	81	81	83	81	„	W.	Cloudy, rain.
11	81	81	83	83	„	E.	Cloudy, rain.
12	82	83	82	82	„	E.	Cloudy, much rain.
13	81	82	82	82	„	E.	Cloudy, much rain.
14	81	82	83	83	107	E.	Cloudy.
15	82	83	84	84	Clouds	E.	Cloudy.
16	84	84	86	83	„	E.	Cloudy, rain.
17	84	82	83	82	„	E.	Cloudy, slight rain.
18	83	83	84	83	„	E.	Cloudy, slight rain.
19	83	83	83	83	„	E.	Cloudy, rain.
20	83	83	84	84	„	E.	Cloudy.
21	83	83	84	84	„	E.	Cloudy, rain.
22	82	82	83	85	„	E.	Cloudy, slight rain.
23	82	83	84	84	105	E.	Cloudy.
24	83	83	84	84	Clouds	E.	Cloudy, slight rain.
25	83	84	85	81	„	E.	Cloudy, rain.
26	82	82	83	82	„	W.	Cloudy, rain.
27	82	82	84	82	„	W.	Cloudy, rain.
28	81	83	87	84	„	W.	Cloudy, slight rain.
29	82	86	86	82	„	W.	Cloudy.
30	82	83	86	83	105	W.	Cloudy, rain.
31	82	85	86	85	106	N. W.	Cloudy, slight rain.

CSL

Comparative Meteorological Register for the months of September 1860 *and* 1861. *Agra Central Prison.*

Date of Month.	Observations taken at 9 *h.* A. M. local time.								Observations taken at 3 *h.* P. M. local time.								Observations taken at 9 *h.* A. M. local time.							
	Dry Bulb Thermometer.		Wet Bulb Thermometer.		Direction and force of Wind.		Amount of Cloud.		Dry Bulb Thermometer.		Wet Bulb Thermometer.		Direction and force of Wind.		Amount of Cloud.		Maximum temperature in Air.		Minimum temperature in Air.		Amount of Ozone.		Amount of Rain.	
	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.	1860.	1861.
1	92	82	78	80	N. W. 1	0	0	10 k.	101	96	77	83	N. W. 1	0	2 k.	2 k.	105	92	88	75	2	·5	...	·75
2	94	80	79	83	N. 1	0	0	2 k.	103	93·5	77	84	0	N. 1	3 k.	3 k.	106	97	78·5	75	2	0		
3	91	88	77	81	N. W. 1	N. E. 1	0	4 k.	101	86	78	81	N. W. 1	N. E. 1	0	6 k.	103	97	77	80	1	1		
4	94	83	79	77	N. E. 1	E. 1	0	4 k.	102	89	77	79	N. E. 1	E. 1	2 k.	8 k.	105	92	77	75	0	2		
5	92·5	82	81	80	0	E. 1	0	7 k.	99	94	79	82	N. E. 1	N. 1	3 k.	6 k.	102	96	81	76	0	·5		
6	92	90	82	82	N. E. 1	0	0	3 k.	98·5	94	80	84	N. E. 1	0	8 k.	3 k.	105	98	80	76	3	0		
7	84	88	80	81	0	0	10 k. s.	4 k.	96	85	82	79	N. 1	N. 1	6 k. c.	10 k.	98·5	97	76	80	2	0	·14	
8	85·5	77	79	77	0	N. 1	8 s. c.	10 k.	94	77	81	76	0	N. 1	6 k. s.	10 k.	98	80	76	77	3	1	·07	·55
9	84	81	78	78	E. 1	N. 1	6 k.	10 k.	88	82·5	78	77	E. 2	N. 2	4 k.	10 k.	91	85	76·5	75·5	3	1	·97	·45
10	84	78	78	75·5	N. E. 1	N. 1	6 c. k.	10 k.	91	80	80	77	N. E. 1	N. 2	5 k.	10 k.	94	87	76	75·5	2	1		
11	83	82	78	78	E. 1	N. 1	10 k.	9 k.	85	85	78	79	E. 1	N. W. 2	10 k.	9 k.	90	88	76	76	0	1	...	·03
12	83·5	87	78	81	0	W. 1	10 k.	2 c. k.	87	90	79	80	N. E. 1	W. 1	10 k. c.	0	90	94	77	75	0	·5	...	·05
13	87·5	86	81	77	S. E. 1	W. 1	10 k.	2 c.	92	91	80	80	0	W. 1	10 k.	3 k.	95	95	75	75	1	·5		
14	88	85	81	76	0	W. 1	10 c.	0	94	91	81	80	0	W. 1	10 k. c.	4 k.	95	95	78	74	0	0		
15	91	86	78	77	N. W. 1	W. 1	5 k.	0	102·5	90	78·5	74	N. 1	W. 1	8 k.	3 k. s.	105	95	79·5	72	1	0		
16	91	86	77	76	N. W. 1	W. 1	0	0	102	90	79·5	81	N. 1	W. 1	3 k.	2 k. s.	103·8	97	77	72	0	0		
17	88	90	76	77	N. W. 1	W. 1	0	0	96	92	79	78	0	W. 1	8 k.	1 s.	102	98	76·5	72	1	0		
18	81·5	80	78	78	0	N. W. 1	8 k. c.	3 k.	93	94	79	78	0	W. 1	3 c.	2 k.	96	99	76·5	75	1	0		
19	84	90	75	78	N. 2	W. 1	5 k.	0	93·5	96	79	78	0	0	3 c.	2 k. s.	96	100	74·5	74	3	0		
20	83	91	76	79	N. E. 1	W. 1	0	0	95·5	95	78	80	N. 1	0	4 c.	0	98	100	74·8	75	0	0		
21	86	89	77	78	N, 2	0	4 c.	0	97	94	79	77	N. 1	W. 1	6 k.	0	100	99	75·5	73·5	2	0	·08	
22	89	88	78	78	N. 1	W. 1	3 k.	0	99	94·5	78	77	N. 1	N. 1	5 k.	2 c.	101	101	76	74	0	0		
23	91	88	78	80	N. 1	E. 1	6 k.	0	100	80	78	78	W. 1	0	3 k.	8 k.	104	97	76	77	0	0		
24	93·5	78	76	74	N. 1	E. 1	2 c.	10 k.	99	81	74	76	N. 1	E. 1	3 k	9 k.	103	85	77	76	0	0		
25	92·5	88	76	81	N. 2	0	0	2 c.	100	95	73	76	N. 1	W. 1	4 k.	0	104	99	74	74	0	0		
26	92	89	73	86	N. 1	W. 1	0	0	101	93	75	76	N. 1	W. 1	2 k.	0	105	102	73	73·5	0	0		
27	91	90	77	78	0	W. 1	0	0	99	96	76	79	E. 2	W. 1	4 k.	0	104	100	73	73	0	0		
28	90	87	78	78	E. 1	E. 1	4 c.	1 c.	98	94	77	81	E. 2	W. 1	4 k. c.	0	102	102	74	76	3	·5		
29	90	89	77	80	S. E. 1	0	4 c.	0	97	93	78	78	E. 1	0	5 k. c.	3 s.	99·5	97	76	75	4	·5		
30	85·5	88	77	79	E. 1	0	0	2 c. k.	96·5	93	76	77	0	0	7 k. c.	3 s.	102	99	74	74	1	0		

W. WALKER, M. .D,
Superintendent, Central Prison.

Copy of a Register of the Thermometer kept at the Jail at Futtehgurh during the months of July and August 1861.

Date.	6 A. M. in Shade.	10 A. M. in Shade.	4 P. M. in Shade.	10 P. M. in Shade.	4 P. M. in Sun's rays.	Direction of Wind.	REMARKS.
1861.							
July ... 1	80	81	83	82	Clouds	E.	Cloudy, slight rain.
2	82	83	85	83	117	E.	Cloudy at times.
3	82	83	82	82	Clouds	E.	Cloudy, slight rain.
4	83	84	84	84	„	E.	Cloudy.
5	84	84	82	83	„	W.	Cloudy, slight rain.
6	82	83	84	84	115	E.	Slight rain.
7	82	82	83	82	Clouds	E.	Cloudy.
8	81	82	82	81	Clouds	W.	Cloudy, slight rain.
9	81	82	83	81	„	E.	Cloudy, rain.
10	81	81	83	81	„	W.	Cloudy, rain.
11	81	81	83	83	„	E.	Cloudy, rain.
12	82	83	82	82	„	E.	Cloudy, much rain.
13	81	82	82	82	„	E.	Cloudy, much rain.
14	81	82	83	83	107	E.	Cloudy.
15	82	83	84	84	Clouds	E.	Cloudy.
16	84	84	86	83	„	E.	Cloudy, rain.
17	84	82	83	82	„	E.	Cloudy, slight rain.
18	83	83	84	83	„	E.	Cloudy, slight rain.
19	83	83	83	83	„	E.	Cloudy, rain.
20	83	83	84	84	„	E.	Cloudy.
21	83	83	84	84	„	E.	Cloudy, rain.
22	82	82	83	85	„	E.	Cloudy, slight rain.
23	82	83	84	84	105	E.	Cloudy.
24	83	83	84	84	Clouds	E.	Cloudy, slight rain.
25	83	84	85	81	„	E.	Cloudy, rain.
26	82	82	83	82	„	W.	Cloudy, rain.
27	82	82	84	82	„	W.	Cloudy, rain.
28	81	83	87	84	„	W.	Cloudy, slight rain.
29	82	86	86	82	„	W.	Cloudy.
30	82	83	86	83	105	W.	Cloudy, rain.
31	82	85	86	85	106	N. W.	Cloudy, slight rain.

GSL

Register of Thermometer kept at the Jail at Futtehgurh,—continued.

Date.	6 A. M. in Shade.	10 A. M. in Shade.	4 P. M. in Shade.	10 P. M. in Shade.	4 P. M. in Sun's rays.	Direction of Wind.	REMARKS.
1861.							
August...1	82	84	87	86	109	W.	Cloudy, rain.
2	84	84	85	85	Clouds	W.	Cloudy, rain.
3	83	84	85	84	,,	W.	Cloudy.
4	82	84	84	83	,,	W.	Cloudy.
5	83	84	83	83	,,	E.	Cloudy.
6	82	83	84	84	114	E.	Cloudy, rain.
7	82	83	84	85	112	E.	Cloudy.
8	83	84	85	86	125	E.	
9	85	86	86	86	107	E.	Cloudy.
10	85	85	86	84	Clouds	E.	Cloudy.
11	85	85	86	86	,,	E.	Cloudy.
12	85	85	86	85	,,	E.	Cloudy.
13	85	84	84	84	,,	E.	Cloudy.
14	83	84	83	84	,,	E.	Cloudy, rain.
15	82	83	84	84	,,	E.	Cloudy.
16	82	84	85	85	118	E.	Cloudy.
17	83	84	83	84	Clouds	E.	Cloudy, rain.
18	83	84	84	84	,,	E.	Cloudy, rain.
19	83	84	86	86	112	E.	Cloudy, slight rain.
20	85	85	87	86	115	E.	Cloudy.
21	85	86	87	86	Clouds	E.	Cloudy.
22	85	86	87	85	102	E.	Cloudy.
23	84	85	87	84	Clouds	E.	Cloudy, slight rain, perfect lunar rainbow, rain at 8 P. M.
24	83	83	85	85	,,	E.	Cloudy.
25	84	84	85	85	,,	E.	Cloudy.
26	82	84	85	85	115	E.	Cloudy, rain.
27	83	84	84	87	Clouds	E.	Cloudy, rain.
28	82	83	84	83	,,	E.	Cloudy, rain.
29	82	82	83	83	,,	E.	Cloudy, rain.
30	82	82	83	81	,,	E.	Cloudy, rain.
31	80	89	81	81	,,	E.	Cloudy, rain.

CHAS. PLANK,
C. A. Surgeon.

GSL

Meteorological Register kept in the Jail Hospital at Allahabad from the 11th May to the 16th August 1861.

Date.		Temperature.				Direction of Wind.	Rain fall.	Remarks.
		Sun-rise.	10 A. M.	4 P. M.	10 P. M.			
1861.			...					
	11	91	95	105	95	N. W.		
	12	87	93	105	93	N. W.		
	13	87	94	105	94	N.		
	14	90	95	106	94	W.		
	15	90	95	106	96	W.		
	16	92	97	108	95	W.		
	17	91	95	106	99	W.		
	18	95	98	108	99	W.		
	19	92	87	97	90	W.		
	20	88	91	95	89	W.		
	21	87	95	99	96	N.	·3	
	22	86	94	101	98	W.		
	23	82	90	92	97	W.		
	24	91	95	100	97	W.		
	25	85	96	103	99	W.		
	26	92	98	104	98	N. W.		
	27	93	99	103	97	N. W.		
	28	94	98	105	99	N. W.		
	29	95	99	106	99	N. W.		
	30	85	97	104	95	E.	...	Dust storm.
	31	83	90	91	96	W.		
June...	1	85	91	96	87	E.	1·2	Very strong dust storm.
	2	86	91	95	86	W.		
	3	84	88	92	89	E.		
	4	87	90	93	90	E.	...	A little storm.
	5	88	93	99	95	E.		
	6	90	94	103	96	E.		
	7	92	96	103	96	E.	...	A little storm.
	8	92	94	100	95	W.	...	Ditto.
	9	90	95	100	96	W.		
	10	93	96	104	95	W.	·1	A little storm.
	11	90	95	101	96	E.		
	12	90	94	99	94	E.		
	13	90	90	92	91	E.		
	14	89	90	88	86	E.	...	A little storm.
	15	84	89	94	90	E.		
	16	87	91	95	92	E.		
	17	88	92	92	85	E.	1·5	Dust storm.
July...	14	81	84	87	85	E.		
	21	81	81	84	83	W.	·2	
	26	84	85	84	83	W.	2	
	31	81	83	85	84	W.		
August	1	81	84	87	85	W·		
	11	83	85	88	87	W.		
	16	85	89	92	89	E.		
Total ...		......	......	......	......	......	5·3	

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Allahabad Central Prison,
The 21st September 1861.

(Sd.) JAMES R. JACKSON,
Superintendent.

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